

NUCLEAR POWER CORPORATION OF INDIA LTD.
(A Government of India Enterprise)
Kudankulam Nuclear Power Project.

TENDER NO: NPCIL/KK-5&6/CONST/ CIVIL-INFRA/PT/2026/49

Name of work: Construction of 203 Nos of Residential Quarters comprising of 40 Nos of E-type (G+10 floor-1 Tower), 80 Nos of D-Special quarters (G+10 floor-2 Tower), 80 Nos of B-type quarters (G+10 floor-2 Tower) and 3 Nos of F Type quarters (G+1 floor) at Anuvijay Township.

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SECTION I
TENDER NOTICE

निविदा आमंत्रण सूचना NOTICE INVITING TENDER

न्यूक्लियर पावर कॉर्पोरेशन ऑफ इंडिया लिमिटेड
NUCLEAR POWER CORPORATION OF INDIA LIMITED
 (भारत सरकार का उद्यम A Govt. of India enterprise)
 सीएंडएमएम-कार्य समूह C&MM-Works Group

एनपीसीआईएल के लिए एवं की ओर से सक्षम प्राधिकारी द्वारा ई-निविदा माध्यम द्वारा निविदा आमंत्रित की जाती है: Online
 tenders are invited through e-tendering mode by competent authority, for and on behalf of NPCIL from eligible bidders
 for the work and details given below:

GENERAL DETAILS

1.	निविदा सं Tender no.	NPCIL/KK-5&6/CONST/CIVIL-INFRA/PT/2026/49
2.	कार्य का नाम Name of work	Construction of 203 Nos of Residential Quarters comprising of 40 Nos of E-type (G+10 floor-1 Tower), 80 Nos of D-Special quarters (G+10 floor-2 Tower), 80 Nos of B-type quarters (G+10 floor-2 Tower) and 3 Nos of F Type quarters (G+1 floor) at Anuvijay Township.
3.	स्थान का नाम Place of work	Anuvijay Township.
4.	कार्य की अनुमानित लागत जीएसटी सहित सभी कर सहित Estimated cost of the work inclusive of all taxes (GST-18% and BOCW 1%)	₹ 117,63,33,480.00 (~117.63 Crores)
5.	बोली जमानत Bid security	₹ 50,52,667.00 (~ 50.52 lakhs)
6.	बोली जमानत प्रस्तुतिकरण का माध्यम Mode of bid security submission	1. ऑनलाइन भुगतान Online Payment 2. क्रेडिट/डेबिट कार्ड Credit / Debit Card
7.	निविदा का माध्यम Mode of tender	सार्वजनिक Public मद दर Item rate स्वदेशी बोली Domestic bidding दो भाग बोली Two part bid
8.	पूरा करने की अवधि Completion period	24 माह Months (मानसून अवधि सहित including monsoon period)
9.	निविदा शुल्क Tender Fees	अप्रतिदेय निविदा शुल्क यथा लागू ऑन-लाइन भुगतान, डेबिट/क्रेडिट कार्ड द्वारा Non-refundable tender fees as applicable through on-line payment, Credit / debit card
10.	वेबसाइट पर निविदा की उपलब्धता Availability of tender on websites	a) डाउनलोडिंग एवं प्रस्तुति के लिए For downloading and submission: https://etenders.gov.in/eprocure/app b) केवल निःशुल्क अवलोकन के लिए For free view only: https://etenders.gov.in/eprocure/app
11.	निविदा डाउनलोड/बिक्री शुरुआत दिनांक से बिक्री अंतिम दिनांक Tender Download/sale start date	वेबसाइट https://etenders.gov.in/eprocure/app पर On website https://etenders.gov.in/eprocure/app From: _____ (10:00 Hrs.) Up to: _____ (17:00 Hrs.)
12.	ऑनलाइन प्रश्न Online queries	https://etenders.gov.in/eprocure/app पर प्रश्न /स्पष्टीकरण अपलोड करने की अंतिम दिनांक एवं समय Last date and time of uploading queries/clarifications on https://etenders.gov.in/eprocure/app से From: Date : _____ समय Time 10:05 Hrs. तक Up to: Date : _____, समय Time : 15.00 hours

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13.	बोलीपूर्वबैठकPre-bid meeting	<p>लागूApplicable (If applicable - माध्यमMode: Online / व्यक्तिगतin person)</p> <p>बैठक दिनांक Meeting: Date: _____ समयTime: 11.00 hrs</p> <p>Link for online meeting will be shared to bidders who wish to attend pre-bid meeting in online mode.</p> <p>All the Bidders may note, for visiting to site or for attending online pre-bid meeting, filled & signed copy Appendix-6 (Visitor's details format) of NIT shall be send to kkctc@npcil.co.in.</p>
14.	बोली की प्रस्तुति Submission of bid	<p>बोली की प्रस्तुति की शुरुआत दिनांक एवं समय</p> <p>Start Date and time of submission of bid</p> <p>दिनांकDate: _____ समयTime: 11.00 hrs</p> <p>बोली की प्रस्तुति की अंतिम दिनांक एवं समय</p> <p>Lastdate and time of submission of bid:</p> <p>दिनांकDate: _____ समयTime: 17.00 hrs</p>
15.	दो भाग निविदा के भाग-I को खोलना Opening of Part-I bid of two part tender/ opening of single part tender	<p>दिनांकDate: _____ समयTime: 10.00 hrs</p> <p>बोलीखोलनेकेबादबोलीकीस्थितिसीपीपीपीपोर्टल(https://etenders.gov.in/eprocure/app) मेंदेखाजासकताहै।</p> <p>The status of bid can be seen at CPPP Portal (https://etenders.gov.in/eprocure/app) (after opening of the bid).</p>
16.	दो भाग बोलीके भाग-II बोलीको खोलना Opening of Part-II Bid of two part bid	<p>बोलीखोलनेकेबादबोलीकीस्थितिसीपीपीपीपोर्टल(https://etenders.gov.in/eprocure/app) मेंदेखाजासकताहै।</p> <p>The status of bid can be seen at CPPP Portal (https://etenders.gov.in/eprocure/app) after opening of the bid.</p>
17.	निविदाआमंत्रितकरनेहेतुसक्षमप्राधिकारी Competent authority inviting tender	Station Director (KKNPP-3&4)
18.	सीपीपीपीकार्यात्मककेअधीनकवरनहींहुएकिसी विषयकेसंबंधमेंपत्राचारकेलिएई-मेलपतायासीपीपीपीकार्यात्मकमौजूदलेकिनपर्या सनहींहै , जैसेभाग-I मूल्यांकन , फाइलसाइजप्रतिबंधताकेविरुद्धअभ्यावेदनभेजना ;Email address for correspondence regarding anything which is not covered under CPPP Functionalities or in case CPPP Functionality exists but it is not adequate, such as: sending of representation against Part-I Evaluation, file size restriction etc;	<p>kkctc@npcil.co.in (for KKNPP)</p>
19.	हेल्पडेस्कHelp Desk	<p>किसीतकनीकीसंबंधीप्रश्न के लिए 24 x 7 हेल्प डेस्क नं. पर कॉल करें :</p> <p>For any technical related queries please call at 24 x 7 Help Desk Number:</p> <p>0120-4001 002 0120-4001 005 0120-6277 787 0120-4711 508</p> <p>ई-मेल सहायता Email Support:</p> <p>तकनीकीTechnical - (support-eproc@nic.in) नीति संबंधीPolicy Related - (cphp-doe@nic.in)</p> <p>(प्रश्नपरकार्यदिवसएवंकार्यघंटेकेदौरानविचारकियाजाएगा।)</p> <p>(Enquiry will be entertained only on working days and during office hours)</p>

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20.	स्वतंत्र बाह्य मानीटर (आईईएम) के संपर्क विवरण (केवल रुपए दस करोड़ या ऊपर के अनुमानित लागत के निविदा के लिए) Contact details of Independent External monitors (IEM) (For tenders of estimated cost of rupees ten crores and above only)	1. श्रीShri. T Jacob ई-मेलE-mail: jacobthariyan@gmail.com 2. श्रीShri. Prakash Chandra ई-मेलE-mail: prakashchandra59@yahoo.co.in
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(PART-1 or OPERATING PART)

PRE-QUALIFICATION CRITERIA

1.0 Work experience:

1.1. Similar Works:

The bidder shall have the experience of similar works satisfying the following eligibility criteria during last **Seven years** ending last day of month, previous to the commencement date of sale/download of tender:

a) Three similar completed works each of value not less than 40% of the estimated cost put to tender.

or

b) Two similar completed works each of value not less than 50% of the estimated cost put to tender.

or

c) One similar completed work of value not less than 80% of the estimated cost put to tender.

1.2. Definition of similar work:

Construction of RCC Multi – Storeyed (above G+3 - storeys or floors) Building or Civil Structures.

(with or without supply of materials)

The definition of Multistoried Building or Civil Structures are as follows:

- a) Construction of high rise (above G+3 storeys or floors) Residential buildings.**
- b) Construction of high rise (above G+3 storeys or floors) Industrial buildings.**
- c) Construction of high rise (above G+3 storeys or floors) Commercial buildings.**
- d) Construction of high rise (above G+3 storeys or floors) Community buildings.**
- e) Construction of high rise (above G+3 storeys or floors) Civil structures.**

1.3. Notes:-

- 1.3.1** The cost of completed work shall mean gross value of the completed work including all the taxes and levies, escalation (if any), cost of material supplied by the client on chargeable basis but excluding those supplied free of cost. The cost of chargeable material shall be the fixed value at which the client had supplied the material.
- 1.3.2** Completed Work shall be work completed in all respect against a Contract awarded to the Bidder for which a completion certificate or similar documentary evidence certifying completeness of work is issued by client. The completed work means works which are completed on or before the last date of month, previous to the commencement date of sale/download of tender.
- 1.3.3** In case the work is started prior to the eligibility period of **7** years (counted backwards starting from the last day of month, previous to the commencement date of sale/download of tender) and completed within the said eligibility period of **7** years, then the full value of work shall be considered against eligibility.
- 1.3.4** Full value of experience will be considered against eligibility for work experience gained as a proprietorship firm or a partnership firm/LLP or a Company or any other legal entity, only in case the bidder is participating in the same name and style. In case of a partnership firm/LLP, if the bidder is claiming experience of previous firm having different name and/or style than the partnership firm/LLP which is participating in bid, then such work experience shall not be considered.

In case of a proprietorship firm, if the bidder is claiming the work experience earned as a partner in a partnership firm/LLP, then the same shall not be considered.

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But if the experience has been earned by the bidder as a partner in a Joint Venture /Consortium, then the proportionate value of experience in proportion to the actual share of bidder in that joint venture/ consortium will be considered against eligibility. The bidder shall furnish information regarding the actual percentage of share and value of experience accordingly.

- 1.3.5** The bidder shall upload details of work executed by them in the excel sheet (Format-2 of NIT) for the works to be considered for qualification of work experience criteria. The work experience listed in excel sheet (Format-2) without uploading any documentary proof shall not be considered for evaluation purpose. The documentary proof of work uploaded without listing the same in excel sheet shall not be considered for evaluation. The following documentary proof are to be uploaded by the bidder:

1.3.5.1 For works executed for Government/Government Autonomous bodies/Public Sector Units, the bidder shall upload following documents-

- a) Work order/purchase order/agreement with bill of quantities and rates.
- b) Completion Certificate or similar documentary evidence certifying completeness of work issued by client clearly indicating the name of work, WO/PO/Agreement no, commencement date, date of final completion, and actual final completion cost. The above desired information can be submitted as part of one or more document.

In case of issue of extension to existing work order with new PO (Purchase Order)/WO (Work Order) number(s), completion certificate or similar documentary evidence certifying completeness of work issued by client shall clearly mention that PO (Purchase Order)/WO (Work Order) with new number(s) are issued as extension(s) to existing work order and belong to the same work in continuation.

- c) Clubbing two or more work orders in one completion certificate shall not be considered for evaluation if individual work order details (completion cost, date etc) is not indicated in single completion certificate. In such cases, bidders shall submit completion certificate or similar documentary evidence certifying completeness of work issued by client for each individual work order.

1.3.5.2 For works executed for clients other than Government/Government Autonomous bodies/Public Sector Units, the bidder shall upload following documents -

- a) Work order/purchase order/agreement with bill of quantities and rates.
- b) Completion certificate or similar documentary evidence certifying completeness of work issued by client clearly indicating the name of work, WO/PO/Agreement no, commencement date, date of final completion, and actual final completion cost. The above desired information can be submitted as part of one or more document.

In case of issue of extension to existing work order with new PO (Purchase Order)/WO (Work Order) number(s), completion certificate or similar documentary evidence certifying completeness of work issued by client shall clearly mention that PO (Purchase Order)/WO (Work Order) with new number(s) are issued as extension(s) to existing work order and belong to the same work in continuation.

- c) Clubbing two or more work orders in one completion certificate shall not be considered for evaluation if individual work order details (completion cost, date etc) is not indicated in single completion certificate. In such cases, bidders shall submit completion certificate or similar documentary evidence certifying completeness of work issued by client for each individual work order.
- d) Certificate for bill wise payment received by the bidder and their respective TDS amount for works executed duly certified by a practicing Chartered accountant on its letter head

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with Membership no/FRN and UDIN. The information shall be uploaded in excel sheet (Format-4 of NIT).

1.3.6 Composite work where only a part of a completed composite work satisfies above criteria of similar work, value of that part only shall be taken as “similar completed work” under 1.1 (a) or (b) or (c) above. Composite work shall mean "a work comprising of items of works of different type/ nature/Engineering". The bidder shall also upload the following details and documents:

- i. Statement of final bill /last bill showing quantity of all items executed under the contract and the total value in such statement should match with the amount mentioned under final value of work done in completion certificate or similar documentary evidence certifying completeness of work issued by client.
- ii. Statement of all items and their quantities segregated from final bill / last bill which are fulfilling the criteria of similar work and their total amount for consideration of work experience certified by client.

1.3.7 Work executed for foreign/Indian clients abroad:

1.3.7.1 Work order/purchase order/agreement with bill of quantities and rates. The details shall be uploaded in excel sheet as per Format-6.

1.3.7.2 Completion Certificate or similar documentary evidence certifying completeness of work issued by client clearly indicating the name of work, WO/PO/Agreement no, commencement date, date of final completion, and actual final completion cost. The above desired information can be submitted as part of one or more document.

In case of issue of extension to existing work order with new PO (Purchase Order)/WO (Work Order) number(s), completion certificate or similar documentary evidence certifying completeness of work issued by client shall clearly mention that PO (Purchase Order)/WO (Work Order) with new number(s) are issued as extension(s) to existing work order and belong to the same work in continuation.

Clubbing two or more work orders in one completion certificate shall not be considered for evaluation if individual work order details (completion cost, date etc) is not indicated in single completion certificate. In such cases, bidders shall submit completion certificate or similar documentary evidence certifying completeness of work issued by client for each individual work order.

1.3.7.3 The bidder shall get the work order/purchase order/agreement along with bill of quantities and rates and completion certificate or similar documentary evidence certifying completeness of work issued by the client attested by the Indian Embassy/Consulate / High Commission in the respective country.

1.3.7.4 Provided further that bidders from member countries to the HAGUE convention, 1961 are permitted to submit requisite documents with “Apostille stamp” affixed by Competent Authorities designated by the government of respective country which would be acceptable in lieu of attestation from the Indian Embassy/ Consulate/ High Commission in their respective countries.

1.3.7.5 In the event of submission of completion certificate or similar documentary evidence certifying completeness of work issued by the client by the Bidder in a language other than English, the English translation of the same shall be duly authenticated by the Chamber of Commerce of the respective country and attested by the Indian Embassy/Consulate / High Commission in the respective country.

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1.3.8 a) The work done in foreign currency shall be converted to Indian rupees as per bills selling exchange rates notified by The State Bank of India prevailing on the actual date of completion of work.

b) The value of work done meeting prequalification criteria shall be brought to current costing level by enhancing the actual value of work at simple rate of 7% per annum for work done in India and 2% per annum for work executed outside India, calculated from the date of completion of work to the last day of month previous to the commencement date of sale/download of tender on prorated basis. The work done in foreign currency before escalation shall be converted to Indian rupees. The date of completion shall be excluded for the purpose of calculating escalation and last date of month previous to the commencement date of sale/download of tender shall be included for the purpose of calculating escalation.

1.3.9 Work experience certificate issued by private individuals shall not be accepted.

1.3.10 Certificates in the name of other companies:

1.3.10.1 Certificates of Subsidiary/Group Companies:

Company/firm can use the work experience of its subsidiary company to the extent of its ownership in the subsidiary company. However, the companies/firms which intend to get qualified on the basis of experience of the parental company/group company shall not be considered. Further, the financial parameters of the subsidiary or Parental Company cannot be used by the other one for qualification.

1.3.10.2 Merger/ Acquisition of Companies:

In case of a Company / firm, formed after merger and/or acquisition of other companies / firms, past experience and other antecedents such as financial parameters (viz. turnover, profit before tax, net worth/solvency/Credit Rating/Line of Credit, bid capacity) of the merged / acquired companies/firms will be considered for qualification of such Company / firm.

1.3.11 The work experience in any of the following case shall not be considered for evaluation:

a) The work completion certificate or similar documentary evidence certifying completeness of work issued by client mentions unsatisfactory/poor performance or the client report mentions unsatisfactory/poor performance such as abandoning the work, rescission of the contract for reasons which are attributable to non-performance of the contractor, inordinate delays in completion, history of litigation resulting in award against the contractor or any of the constituents, or financial failure due to bankruptcy, and so on.

b) The work order which has resulted in banning (or any other term meaning the same) of the bidder.

1.3.12 In case of public private partnership if the bidder has executed a work for a concessionaire, then the work experience certificate issued by such concessionaire or the public authority concerned will also be accepted.

2.0 Financial criteria:

2.1 Average annual financial turnover:

Average annual financial turnover of bidder should be at least 30% of the estimated cost put to tender during the immediate last three consecutive financial years previous to the one in which tender sale/download has been commenced as published on e-tendering portal. In case the Bidder has been in existence for less than three financial years, still the average annual turnover shall be calculated assuming that the Company has existed for 3 years.

2.2 Profit Before tax (applicable for tenders of estimated cost put to tender of ₹ 10 Crores and above):

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The profit before tax (PBT) of bidder should be positive in atleast three years during last five consecutive financial years previous to the one in which tender sale/download has been commenced as published on e-tendering portal. In case bidder has been in existence for less than 5 years, the profit before tax shall be positive for minimum 2 years since its existence.

2.3 Solvency or Net worth or Credit Rating or Line of Credit:

Solvency:

Solvency Certificate in the format as per Appendix-5 issued by a Nationalized or any Scheduled Bank (other than Cooperative Bank) in favour of the bidder should be for a value not less than at least 40% of Estimated Cost put to tender. The solvency certificate should have been issued within 6 months from original last date of the submission of the bid. The bidder has to upload a scanned copy along with the bid. A notarized copy of solvency certificate shall be submitted along with other notarised documents as per Clause 20.2 of Part-2 (standard part).

OR

Net worth:

Net Worth of the Bidder as per the latest audited financial year previous to the one in which tender sale/download has been commenced as published on e-tendering portal shall be at least 10 % of estimated cost put to tender.

Also, Net Worth of the Company has not been eroded by more than 30% in the last three audited financial years previous to the last day of month previous to the commencement date of sale of tender.

The definition of Networth for the above criteria shall be:

Net Worth shall mean aggregate value of the paid-up share capital and all reserves created out of the profits and securities premium account, after deducting the aggregate value of the accumulated losses, deferred expenditure and miscellaneous expenditure not written off, as per the audited balance sheet, but does not include reserves created out of revaluation of assets, write back of depreciation and amalgamation.

The Net worth Certificate issued by practicing Chartered Accountant as per Appendix 11 with his seal, signature, membership number/ FRN and UDIN shall be submitted by the bidder to substantiate their claim.

OR

Credit Rating:

Evidence of the credit rating of the bidder for long term debts (valid as on commencement date of sale/download of tender, if rated) by any of the RBI approved rating agency shall be at least "Investment Grade" (as per RBI Guideline).

Copy of rating certificate or certified pdf copy of relevant page(s) of Annual Report reflecting Credit Rating duly certified by practicing Chartered Accountant on its letterhead with his seal, signature, membership number/ FRN and UDIN shall be submitted by the bidder to substantiate their claim should be submitted.

OR

Line of Credit:

Bidder shall submit documentary evidence from a Nationalized or any Scheduled Bank (other than Cooperative Bank), stating that in the event of the contract being awarded to the bidder, they will provide, if need arises, line of credit to the bidder for an amount of not less than 40% of estimated cost put to tender.

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The line of credit certificate should have been issued within 6 months from original last date of the submission of the bid. The bidder has to upload a scanned copy along with the bid. A notarized copy of line of credit certificate shall be submitted along with other notarised documents as per Clause 20.2 of Part-2 (standard part).

2.4 Bid Capacity

For tenders of estimated cost put to tender of ₹ 10 Crores and above, bidders who meet minimum criteria will be qualified only if their available bid capacity is more than the bid value i.e., estimated cost put to tender. The bid capacity of the contractor shall be determined by the following formula:

$$\text{Bid Capacity} = (A \times N \times 2) - B$$

Where,

'A' = maximum value of works executed in any one year during last five financial years.

'B' = Value of existing commitments and ongoing works calculated from last date of month previous to one in which this NIT has been published, to be completed in the next 'N' years.

'N' = Number of years prescribed for completion of the subject contract.

Ongoing Works also include work under extension.

Maximum value of works executed ("A") would represent the highest turnover among the last 5 financial years.

The above financial data (i.e., value of works executed in any one year i.e., annual turnover) will be brought to current costing level by enhancing the actual value of work at simple rate of 7% per annum or part thereof calculated from the last date of that financial year. The last date of that financial year shall be excluded for the purpose of calculating escalation and last date of month previous to the commencement date of sale/download of tender shall be included for the purpose of calculating escalation.

Bid Capacity has to be submitted by the bidder in Format 7 of NIT and the same shall be certified by the chartered accountant with his seal, signature, membership number/ FRN and UDIN.

If it is found at any stage that the bidder has submitted incorrect data for assessment of bid capacity the bid or if the work is awarded the work order shall be rejected/cancelled and other penal action as per NIT and GCC shall be taken.

2.5 The bidders should note the following:

2.5.1 Bidder shall upload details containing Financial data viz. Annual turnover, Profit before tax, Net worth in a certificate (as per Format-3 of NIT) duly certified by practicing Chartered Accountant on its letterhead with his seal, signature, membership number/ FRN and UDIN. And the same financial data as per Chartered Accountant's Certificate shall be listed by Bidder in excel sheet (as per Format-3 of NIT).

In case balance sheet of the last financial year is not audited, the bidder has to upload a certificate from a practicing Chartered Accountant on its letterhead with his seal, signature, membership number/ FRN and UDIN, certifying that "the balance sheet for the preceding year has not been audited so far". In such case the financial data of one more preceding audited financial year as applicable shall be submitted by the Bidder for evaluation purpose. Further, if data of any preceding year as above is not submitted by bidder, same shall be considered zero during evaluation.

2.5.2 There is no need to upload voluminous balance sheet. Further financial details and related supporting documents, if required may be asked from bidder after opening of Part 1 bid.

2.5.3 In case of any mismatch in details of excel sheet and uploaded document, details given in uploaded document certified by CA with seal, signature, membership number/ FRN and UDIN shall be considered for Part-1 evaluation.

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3.0 EPF (Employees' Provident Fund) registration:

- 3.1** The bidder shall possess EPF registration and upload valid EPF registration along with the bid.
- 3.2** The EPF registration requirement may not be applicable for a few works if the same is mentioned explicitly in the schedule-A.

4.0 PAN (Permanent Account Number):

The bidder shall possess PAN card and upload valid PAN card along with the bid.

5.0 ESI (Employee State Insurance) registration (Not Applicable)

- 5.1** ~~The bidder shall possess ESI registration and upload valid ESI registration along with the bid.~~
- 5.2** ~~The ESI registration requirement may not be applicable for a few works if the same is mentioned explicitly in the schedule-A.~~

6.0 Additional Pre-qualification criteria: (Not Applicable)

7.0 Joint Venture (Unincorporated)/Consortium:

- 7.1** The use of word Joint Venture(s) /JV anywhere in this clause refers to "unincorporated Joint Venture(s)/JV".
- 7.2** Joint ventures (JV) / Consortium shall be allowed as stipulated in Schedule A.
- 7.3** In case of Joint Venture (Unincorporated)/Consortium, the provisions as per clause no. 30 of Part 2(Standard Part) of NIT shall be read in conjunction with provisions as per Part 1(Operating Part) of NIT for meeting Pre-Qualification eligibility criteria.
- 7.4** Number of members in a JV /Consortium shall not be more than three.
- 7.5** A member of JV/Consortium shall not be permitted to participate either in individual capacity or as a member of another JV/Consortium in the same tender.
- 7.6** The bid document shall be downloaded and uploaded only in the name of Lead Partner and not in the name of other constituent members.
- 7.7** One of the members of JV/ Consortium shall be the lead member of the JV/Consortium who shall have a majority (at least 51%) share of interest in the JV/Consortium. The partners having less than 20 % participation will be termed as non-significant partners and will not be considered for evaluation which means that their financial soundness and work experience shall not be considered for evaluation of JV/Consortium.
- 7.8** The lead member of JV/Consortium shall not be foreign company/entity. Foreign company/entity can participate only as other than lead member in JV/Consortium through subsidiary company formed in India.
- 7.9** The members of JV/Consortium shall not be itself a JV/Consortium.

7.10 Credentials & Qualifying Criteria:

7.10.1 Work Experience

- a)** In case of Joint Venture/Consortium the works done either by the same joint venture (or consortium) or any member of the Joint Venture/ Consortium shall be considered for this criterion. The work of each member, if done in Joint Venture/Consortium will be taken as per the percentage participation i.e., value of a completed work done by a Member in an earlier Joint venture/ Consortium shall be reckoned only to the extent of the concerned member's share in that JV/Consortium.
- b)** In case of joint venture / consortium, full value of work if done by the same joint venture/consortium shall be considered.

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- c) In case of work experience of individual members being considered for PQ (Pre-Qualification) evaluation:
 - i. For compliance with one completed work of 80% of estimated cost by lead partner will only be considered.
 - ii. For compliance with two completed works of 50% of estimated cost, minimum one work of lead partner is required.
 - iii. For compliance with three completed works of 40% of estimated cost, minimum one work of lead partner is required.

7.10.2 Financial Criteria

- a) Average Financial Turnover and Net Worth/Solvency/Line of Credit will be based upon weighted average as per their percentage share of participation in the joint venture / consortia.
- b) Credit Rating (if submitted) shall be met by all the JV/Consortium Partners individually.
- c) To qualify Net Worth/Solvency/Credit Rating/Line of Credit criteria, all partners of JV/Consortium shall meet the same type of financial criteria.
- d) The Profit Before Tax (PBT) criteria shall be met by all the JV/Consortium Partners individually.
- e) For Bid Capacity, in case of JV/Consortium, all the partners/participants must furnish the details of existing commitments and balance amount of ongoing works with each member of JV/Consortium and also the works which are awarded to tenderer but yet not started upto last date of month previous to one in which this NIT has been published. In case of no works in hand, a 'NIL' statement should be furnished. This statement should be submitted duly certified verified by a practicing Chartered Accountant.
Value of a completed work/work in progress/work awarded but yet not started for a Member in an earlier JV/Consortium shall be reckoned only to the extent of the concerned member's share in that JV/Consortium for the purpose of satisfying his/her compliance to the above mentioned bid capacity criteria.
- f) In the case of joint venture / consortia, bid capacity of each member will be computed applying above formula (mentioned at clause no. 2.4 of Part-1(Operating Part) of NIT) and combined bid capacity of the joint venture /consortia will be weighted average of the individual bid capacity of the members as per their percentage share of participation in the joint venture / consortia.

Example for calculation of bid capacity in case of JV / Consortium:

Suppose there are 'P' and 'Q' members of the JV/Consortium with their participation in the JV/Consortium as 70% and 30% respectively and available bid capacity of these members as per above formula (mentioned at clause no. 2.4 of Part-1(Operating Part-1) of NIT) individually works out 'X' and 'Y' respectively, then Combined Bid Capacity of JV/Consortium shall be as under:

Combined Bid Capacity of the JV/Consortium = $0.7X + 0.3Y$.

- g) IBC (Insolvency and Bankruptcy Code) details/declaration shall be submitted by all the JV/Consortium Partners individually and all shall meet criteria as per clause no. 11.4 individually.
- h) Along with bid all partner of JV/Consortium shall submit permanent account number (PAN) and GSTIN.

8.0 MSE(Micro and Small Enterprises): (Not Applicable)

~~Applicability for exemption/relaxation from meeting the qualification criteria in respect of prior experience and financial criteria viz. (Turnover, Profit before Tax, Bid Capacity Solvency/Net Worth/Credit Rating/Line of Credit) subject to meeting of quality and technical specifications shall be as specified in clause no. 25 of Standard Part (Part 2) of NIT and Schedule A for eligible MSE(s).~~

~~In case of exemption/relaxation from meeting the qualification criteria in respect of prior~~

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~~experience and financial criteria viz. (Turnover, Profit before Tax, Bid Capacity Solvency/Net Worth/Credit Rating/Line of Credit), the clause stipulating meeting of quality and technical specifications shall be as specified in clause no. 25 of Standard Part (Part 2) of NIT and Schedule A for eligible MSE(s).~~

9.0 Startup: (Not Applicable)

~~Applicability for exemption/relaxation from meeting the qualification criteria in respect of prior experience and financial criteria viz. (Turnover, Profit before Tax, Bid Capacity Solvency/Net Worth/Credit Rating/Line of Credit) subject to meeting of quality and technical specifications shall be as specified in clause no. 32 of Standard Part (Part 2) of NIT and Schedule A for eligible Startup(s).~~

~~In case of exemption/relaxation from meeting the qualification criteria in respect of prior experience and financial criteria viz. (Turnover, Profit before Tax, Bid Capacity Solvency/Net Worth/Credit Rating/Line of Credit), the clause stipulating meeting of quality and technical specifications shall be as specified in clause no. 32 of Standard Part (Part 2) of NIT and Schedule A for eligible Startup(s).~~

10.0 Make in India:

Eligibility of Class-I, Class-II Local Supplier as per “PPP-MII Order 2017” for participation under this tender shall be as specified in clause no. 33 of Standard Part (Part 2) of NIT and in Schedule-A.

11.0 GENERAL ELIGIBILITY CRITERIA

The bidders who do not meet following eligibility criteria are ineligible to participate in the tender. Their bids shall not be considered for evaluation.

11.1 A Bidder may be a natural person, private entity, government-owned entity, PSU, Government Autonomous Bodies, Joint Venture Company (JVC), Joint Venture (unincorporated), Consortium or any other legal entity. Joint Venture (unincorporated)/Consortium are not permitted to participate in bidding process until unless specifically permitted in the bid document.

11.2 A bidder shall not have a conflict of interest. All bidders found to have a conflict of interest shall be disqualified and bids submitted by such bidders shall be summarily rejected. A bidder may be considered to have a conflict of interest with one or more parties in this bidding process, if:

- a) A bidder participated as a consultant in the preparation of the design or technical specifications of the works that are the subject of the bid; or
- b) A bidder was affiliated with a firm or entity that has been hired (or is proposed to be hired) by the Corporation or as engineer-in-charge for the contract.
- c) One firm/entity applies for bid both as an individual firm/entity and as part of joint venture/consortium/partnership firm/LLP.
- d) If bidders in two different bids have controlling shareholders in common.
- e) Submit more than one bid.
- f) One firm/entity applies for bid as a part of two different joint venture/consortium/partnership firm/LLP.

11.3 The bid without stipulated bid security amount / MSE registration certificate/Start-up Registration Certificate shall be summarily rejected.

11.4 Insolvency and Bankruptcy Code (IBC), 2016

11.4.1 The Bidders shall be ineligible to participate in the bid and hence disqualified in case of

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following:

- a) Bidder(s) who are undergoing insolvency resolution process or liquidation or bankruptcy proceeding under Insolvency and Bankruptcy Code, 2016 or as amended from time to time.
- b) Bidder(s) whose insolvency resolution process or liquidation or bankruptcy proceeding is initiated under the Code at any stage before award of work.

- 11.4.2** It will be the responsibility of the bidder to inform within 15 days from the date of order of insolvency resolution process or liquidation or bankruptcy proceeding passed by the Adjudicating Authority namely, National Company Law Tribunal (NCLT) or Debt Recovery Tribunal (DRT) under the Code.
- 11.4.3** If bidder refuses or fails to share the information regarding their status of insolvency resolution process or liquidation or bankruptcy proceeding in their bid or at any later stage, their offer is liable to be rejected.
- 11.4.4** Corporation reserves the right to cancel/terminate the contract without any liability on the part of Corporation immediately on the commencement of insolvency resolution process or liquidation or bankruptcy proceeding of any party under the contract.
- 11.4.5** Corporation shall finalize the tender without considering the bid of the bidder undergoing insolvency resolution process or liquidation or bankruptcy proceeding under the Code regardless of the stage of tendering. The bid of such Bidder shall be rejected as being disqualified.
- 11.4.6** The bidder has to submit self-declaration of proceedings under IBC as per Appendix-12.
- 11.5** The bidder who has been blacklisted / de-registered / holiday listed/debarred/ banned for business dealing /any other term meaning the same by NPCIL or any other Competent Authority restricting the bidder from participating in tenders/contracts of Government or CPSEs and applicable to NPCIL shall not be eligible for participation in tenders of Corporation for that period.

12.0 Uploading supporting documents:

- 12.1** The Bidder shall upload the following documents:

S.NO.	DESCRIPTION
1.	Udyam registration Certificate Uploading is mandatory if bidder wishes to avail benefit as MSE under clause no. 25 of Standard Part (Part 2) of NIT.
2.	Power of attorney or other appropriate document authorizing DSC Holder to submit the bid as per clause no. 15.13 of Standard Part (Part 2) of NIT.
3.	a. Memorandum of Association/Article of Association in case of Company or b. Partnership deed in case of Partnership firm or c. Self-undertaking in case of proprietorship firm (Appendix – 10)
4.	PAN card.
5.	GST registration certificate (GSTIN).
6.	Registration of EPF (for applicability refer Schedule A).
7.—	ESIC registration (for applicability refer Schedule A).

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8.	Work order/Purchase order/Agreement with bill of Quantities and Rates along with completion certificate or similar documentary evidence certifying completeness of work issued by client for works meeting pre-qualification criteria of Work Experience in Format-2.
9.	Work order/Purchase order/Agreement with bill Of Quantities along with completion certificate or similar documentary evidence certifying completeness of work issued by client for works executed in foreign countries meeting pre-qualification criteria of Work Experience in Format-6.
10.	In case work experiences with other than Government/Government Autonomous bodies/Public Sector Units, statement for Bill wise payments up to final/last bill as per Format-4.
11.	Financial data as per Format-3.
12.	Bank solvency certificate as per Appendix-5 or Net Worth Certificate as per Appendix -11 or Copy of rating certificate or Certified pdf copy of relevant page(s) of Annual Report reflecting Credit Rating or Documentary evidence regarding line of credit from a Nationalized or any Scheduled Bank (other than Cooperative Bank).
13.	Certification under preference to Make in India order (Appendix -9).
14.	"Certificate of Recognition" issued by DIPP (Department of Industrial Policy & Promotion or DPIIT (Department for Promotion of Industry and Internal Trade), Ministry of Commerce & Industry. Uploading is mandatory if bidder wishes to avail benefit as Start-up under clause no. 32 of Standard Part (Part 2) of NIT.
15.	Additional documents as per Pre-Qualification criteria.
16.	In case of Joint Venture (unincorporated)/Consortium (if applicable as per NIT), documents as per clause no. 30 of Standard Part (Part 2) of NIT.
17.	Bid Capacity data as per Format-7
18.	Self-Declaration of proceedings under IBC as per Appendix-12.
19.	List of QR/PQ related documents required to be certified & verified for authenticity from Independent Statutory Auditor or TPIA (Annexure-IV)

- 12.2** The bidder shall upload scanned copy of originals documents for pre-qualification evaluation, preferably in pdf format. All the uploaded documents should be readable, legible and printable.
- 12.3** In case of limited / single / nomination tender the bidders are not required to upload information and documents for prequalification, however, documents against S.No.1, 2,3,4,5,6,7,13,14,15,16,18 should be uploaded in all cases.
- 12.4** Corporation reserves the rights of getting the documents cross verified from the documents issuing authority.

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SCHEDULE 'A'

S. No.	Clause no. of GCC/NIT	Description	Stipulation	
1.	GCC 1.1.1	Contract Accepting authority	ED (Projects-LWR)	
2.	GCC 2.1.3	Time by which possession of site will be given	Immediate after issue of LOI/WO	
3.	GCC 4.14.1	Availability of electricity	Yes	
4.	GCC 4.14.1	The rate at which electricity will be charged	Rs. 12.85	Prevailing TNEB Tariff
5.	GCC 4.19.2	Number of trees to be planted by the contractor	NA	
6.	GCC 4.22.1	Number of Apprentices to be trained by the contractor	0	
7.	GCC 4.23.2	Availability of water supply by Corporation	No	
8.	GCC 4.23.2(i)	Water charges	NA	
9.	GCC 4.24.2	Availability of Land / office space for Contractor's Office, Stores etc.	Yes	
10.	GCC 5.2	Schedule of employment of labour		
		(i) As per Central Government	As per Section III	
		(ii) As per State Government	As per Section III	
11.	GCC 5.6.3	Penalty, for not providing arrangements and facilities as per safety guidelines.	As per Section III	
12.	GCC 5.6.4	Industrial safety training to be provided by Corporation.	Yes	
13.	GCC 5.6.14	Minimum number of safety professionals to be deployed by contractor.	2	
14.	GCC 5.6.15	Penalty, for not deploying the minimum number of safety professionals.	As per Section III	
15.	GCC 7.8.1	Applicability of incentive clause	No	
16.	GCC 7.8.2	Maximum value of the contract value, which shall be paid as incentive.	NA	
17.	GCC 7.9.3	No of days of suspension for Entitlement of compensation if cumulative period of suspension exceeds	30 days and as per note no. 1 below	
18.	GCC 9.1.1	Defect Liability Period for the contract	36 Months	
19.	GCC 9.1.6	Applicability of liability towards Latent defect	Applicable	
20.	GCC 11.3.3	Various components expressed as a percentage of contract Price.		
21.		Fixed component (F)	15	
		Unskilled labour component (lu)	13	
		Semi-skilled labour component (lss)	NA	
		Skilled labour component (ls)	12	
		Highly skilled labour component	0	
		Material component		
		Cement & Lime	(m)	4
		Ferrous Steel	(n)	12
		Other Materials	(o)	26
			(p)	0
		All other Materials	(q)	0
		P.O.L component (d)	2	
		Non escalable component (NE)	16	

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S. No.	Clause no. of GCC/NIT	Description	Stipulation
		Nearest fuel station to be considered for diesel prices (P.O.L)	Anuvijay Township
22.	GCC 12.1.4	The rate of Interest to be charged on mobilization advance	10.970%
23.	GCC 12.2.1	Applicability to submit the bills and measurement in computerised form	Applicable
24.	GCC 12.5.1	Simple interest for delayed payment.	12.250%
25.	GCC 15.1; Clause no. 3 of Part 1 of NIT; Clause no. 5 of Part 1 of NIT	(a) Employee compensation policy	Yes
		(b) Coverage under ESI (Employee State Insurance)	NA
		(c) Third Party liability @ 10 % of the contract price subjected to maximum of rupees 50.00 lakhs.	Applicable
		(d) CAR/ EAR Policy for the whole contract value	Applicable
		(e) Comprehensive Insurance policy for Transport contracts	Not Applicable
		(f) EPF (Employees' Provident Fund) registration	Applicable
		(g) Group Insurance Policy	Applicable
26.	Clause no. 6.1 of Part 1 of NIT	Applicability of Electrical Contractor License	Not Applicable
27.	Clause no. 7 of Part 1 of NIT; Clause no. 30 of (Part 2) of NIT	Permission for joint venture (unincorporated) / consortium to participate	Yes
28.	NIT (Part 2) 35.0	Supplier (in case of CLND act)	NPCIL
29.	NIT (Part 2) 28.0	Applicability of the Building and Other Construction workers (Regulation of Employment and Conditions of Service) (BOCW) Act, 1996 and the Cess Act, 1996	Applicable
		Rate of labour cess (as per BOCW)	1%
30.	NIT (Part 2) 27.0	Applicability of integrity pact	Applicable
31.	Clause no. 8 of Part 1 of NIT; Clause no. 25 of Part 2 of NIT	a) Purchase preference to MSE registered bidders	Not applicable
		b) Waiver for Submission of bid security	Not applicable
		c) Splitting of quantity for award to MSE	Not applicable
		d) Exemption/ Relaxation from meeting the qualification criteria in respect of prior experience and financial	

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S. No.	Clause no. of GCC/NIT	Description	Stipulation
		criteria viz. (Turnover, Profit before Tax, Bid Capacity, Solvency/Net Worth/Credit Rating/Line of Credit) for eligible MSE(s) subject to meeting of quality and technical specifications	No
		e) In case of exemption/relaxation from meeting the qualification criteria in respect of prior experience and financial criteria viz. (Turnover, Profit before Tax, Bid Capacity Solvency/Net Worth/Credit Rating/Line of Credit), the clause stipulating meeting of quality and technical specifications	Not applicable
32.	Clause no. 9 of Part 1 of NIT; Clause no. 32 of Part 2 of NIT	a) Exemption/ Relaxation from meeting the qualification criteria in respect of prior experience and financial criteria viz. (Turnover, Profit before Tax, Bid Capacity, Solvency/Net Worth/Credit Rating/Line of Credit for eligible Startup(s) subject to meeting of quality and technical specifications	No
		b) Waiver for Submission of bid security	Not applicable
		c) In case of exemption/relaxation from meeting the qualification criteria in respect of prior experience and financial criteria viz. (Turnover, Profit before Tax, Bid Capacity Solvency/Net Worth/Credit Rating/Line of Credit), the clause stipulating meeting of quality and technical specifications	Not applicable
33.	NIT (Part 2) 33	Divisibility of Scope in Make in India clause no. 33	Non-Divisible
34.	NIT (Part 2) 33	Eligibility of Class of Contractor as per Make in India Order	Class I Local Supplier/ Class II Local Supplier
35.	NIT (Part 2) 33	Minimum Local Content (%) for Class I Local Supplier	More than 50%
36.	NIT (Part 2) 33	Minimum Local Content (%) for Class II Local Supplier	More than 20%
37.	NIT (Part 2) 36.0	Applicability of Contract employee information management system	Applicable
38.		Minimum number of labours to be deployed	
		a) Unskilled	0
		b) Semi- Skilled	0
		c) Skilled	0
		d) Highly skilled	0
		e) Any other category	0
39.		Penalty for shortfall of minimum number of Labours to be	

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S. No.	Clause no. of GCC/NIT	Description	Stipulation
		deployed as per special condition of contract	
		a) Unskilled	0
		b) Semi- Skilled	0
		c) Skilled	0
		d) Highly skilled	0
		e) Any other category	0
40.		Applicability of Factory Act	Applicable
41.		Place of service	Anuvijay Township
42.		Minimum number of Work Supervisor/ Engineer to be deployed	Engineers -2 Nos Supervisors -2 Nos
43.	NIT (Part 2) 13.0	Bid Validity	180 days

Note: (1) This clause shall be applicable when the cumulative suspension is beyond 30 days. In specific cases such as contracts related to bi-annual shutdown, refueling outage etc., reduced number of days may be specified on case to case basis. (in reference to S.No. 17 of Schedule A)

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SCHEDULE 'B'

MATERIAL ISSUED TO THE CONTRACTOR

(The Engineer-in-charge/Officer-in-charge to indicate permissible wastage before issue of tender duly approved by the Competent Authority)

Sl. No	Particulars	Unit	Rate at which Material will be issued	Maximum invisible wastage (Non-Returnable) (%)	Maximums permissible wastage (Returnable in case of free issue) (%)	Qty. to be issued (approx.)
----- NA -----						

SCHEDULE 'C'

TOOLS AND PLANT TO BE HIRED TO THE CONTRACTOR

Sr. no.	Particulars	Number available	Hire charges per Unit per working day Rs.	Frequency of Maintenance	Value Per Unit	Place of Issue	Number Reqd. by the Contractor
----- NA -----							

Tools and Plants are not expected to be hired out to the Contractor. If, however, any tools and plants are available at the time of performing the work the same may be hired out at rates to be decided by the Engineer-in-charge/Officer-in-charge. The Corporation reserves the right not to hire out any T&P and to withdraw at any time such T&P hired out.

The Contractor shall ask the Engineer-in-charge/Officer-in-charge the value of tools & Plants for which these have to be insured and carry out the insurance accordingly in case insurance not available with NPCIL.

NOTICE INVITING TENDER (PART-2 or STANDARD PART)

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1.0 Scope of bid

1.1 The Nuclear Power Corporation of India Limited (referred to as Corporation or NPCIL in these documents) invites bids for the work. The successful bidder should deliver the Works/Services/Consultancy during the period of work as per the terms and conditions specified in the NIT, general condition of contract, technical specifications, special conditions of contract, schedules, corrigendum, Tender Document, work order.

2.0 Note for bidders

2.1 Bidding is open to all eligible bidders meeting the eligibility criteria as defined in prequalification criteria. Bidders are advised to note the pre-qualification criteria specified in the notice inviting tender before submission of bid.

2.2 It may be noted that mere submission of bid does not imply that your offer shall be considered. Bids are considered only after NPCIL assess the document uploaded along with the bid by the bidder meets the pre-qualification criteria as specified in notice inviting e-tender during evaluation of bid.

2.3 This tender document is non-transferable. The registration details provided for downloading the tender shall be of the same vendor who is uploading the bid otherwise their bids shall not be opened and summarily rejected.

3.0 One Bid per Bidder

A bidder shall submit only one bid against a particular tender. Bidder submitting multiple bids will cause all of the bids in which the Bidder has participated to be disqualified.

4.0 Cost of bidding

4.1 The bidder shall bear all costs associated with the preparation and submission of his bid and the Corporation will in no case be responsible and liable for these costs.

5.0 Site visit

5.1 The bidder or his authorized personnel or agents will be granted permission by the Corporation to enter upon its premises and lands for the purpose of site visit. However, the bidder, his personnel and agents will be responsible against all liability in respect thereof, including death or personal injury, loss of or damage to property, and any other loss, damage, costs, and expenses incurred as a result of the site visit.

5.2 The bidder should inform the Corporation at least three days in advance about the proposed site visit with copy of photo identification like Aadhar card, passport, voters' identity card, driving license, PAN card etc. for preparation of gate pass.

5.3 The bidder, at his own responsibility and risk is encouraged to visit, inspect and survey the site and its surroundings before uploading his bid as to the form and nature of the site, the means of access to the site, the accommodation he may require, etc.

5.4 In general, bidders shall obtain all necessary information as to risks, contingencies and other circumstances which may influence or affect their bid. A bidder shall be deemed to have full knowledge of the site, whether he inspects it or not and no extra claims due to any misunderstanding or otherwise shall be allowed.

5.5 The costs of visiting the site shall be at the bidders' own expense. Any report shared at the site, by the Corporation is subject to verification by the Bidder. Any deviations in information in the report and the actual site will not be the responsibility of the Corporation.

5.6 The bidders shall bring original photo identification like Aadhar card, passport, voters' identity card, driving license, PAN card etc. for security regulations. Any electronic devices like mobiles, radio, transistors camera etc. are not allowed inside NPCIL premises and the same shall be left at security gate at the risk of bidders. The bidders are requested to e- mail the details of authorized

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representative in the prescribed format.

5.7 Request for clarification by bidder:

A Bidder requiring any clarification of the bidding document may submit his queries during the time allowed for the same on the e-tendering portal and shall put the query under appropriate tab of the on-line bid. The query raised in any other way through e-mail/physical letter, etc., shall be ignored and shall not be responded. Corporation will respond to any request for clarification or modification of the bidding documents that it receives within the time line specified.

Corporation will upload the Clarifications under appropriate tab or through corrigendum at e-tender website where the bidders can view these clarifications. The questions/query received after stipulated date and time will not be entertained and no response shall be made. Bidders are advised to regularly check the e-Tendering Portal for response to queries/corrigendum etc regarding posting of clarification, if any. Bidders must check all the clarifications issued before submission of Bid. Should the Corporation deem it necessary to amend the Bidding Document as a result of a clarification, it will do so and upload the amendments in the tender on the e-tendering portal. The submission of bid shall mean that the bidder has seen all the responses to queries against the tender and has accepted the contents.

6.0 Content of bidding documents

6.1 Submission of a bid by a bidder implies that he has read and understood the bid document, clarification, corrigendum and has understood scope and specifications of the work to be executed and the conditions and rates at which stores, tools and plant, etc, will be issued to him by the Corporation and local conditions and other factors having a bearing on the execution of the works.

6.2 The documents listed below comprise one set of bid document:

Section-I Notice Inviting tender (Including Pre-qualification criteria), e-tender notice

Section – II Memorandum of Agreement

Section – III Special Conditions of Contract

Section – IV General Conditions of Contract and various formats

Section – V Technical specifications

Section – VI Drawings, if any

Section – VII Schedule of Material to be supplied by the Corporation

Section – VIII Schedule of quantities / bill of quantities

6.3 Submission of bid by bidder shall be considered as acceptance of all the conditions in bid document (except deviation proposed, if any). In case of modification or withdrawal of submitted bid within the bid validity period, such bid shall not be considered for evaluation and the bid security will be forfeited and further action may be taken as per tender conditions including debarring/business banning from participation in retendering of the same work.

Bidders may bring out any deviations, if any, with respect to General Conditions of Contract, Special Conditions of Contract, Technical Specifications, Bid document etc, in Appendix-12 and upload it along with Part I bid. However, Tenders/Bids submitted subject to counter conditions or with any deviations from the General Conditions of the Contract / Special Conditions of Contract/ Technical Specifications/Bid Document runs the risk of rejection. It should also be realized that failure to bring out deviations / not uploading any deviations (along with Part -1 Bid) from the General Conditions of the Contract / Special Conditions of Contract/ Technical Specifications/Bid Document would imply that the Bidder is willing to execute the contract as per the Corporation's Terms and Conditions of the Tender.

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6.4 Submission of bid shall be considered as acceptance of “**undertaking by bidder**” as enclosed as Appendix-4.

Bid shall be uploaded through e-tendering Portal only. Manual/ Hard Copy of the Bid shall not be accepted.

7.0 Pre-bid meeting:

7.1 Corporation may conduct pre-bid meeting through electronic mode.

In case of in person pre-bid meeting the bidder or his officially authorized representative is invited to attend pre-bid meeting, which will take place as referred in instructions to the bidders. The bidder desirous to attend prebid meeting shall intimate the details of his authorized representative in prescribed format to the Corporation (at designated email) to facilitate his attending the meeting. A maximum of two representatives per Bidder will be allowed to participate on production of authority letter from the Bidder and ID.

7.2 The purpose of the pre-bid meeting is to clarify various issues. The bidder is requested to upload their questions/queries on e-tendering portal at the appropriate tab before stipulated date and time for uploading the same. The queries which are received after stipulated date and time as per NIT will be ignored and will not be responded.

7.3 Attending the pre-bid meetings is in the interest of bidders to understand the scope of work of the tender. The bidders are insisted upon to attend the pre-bid meetings for their own benefit. However, in case the bidders do not attend the pre-bid meetings, it would be presumed that they have understood the scope of work.

7.4 Minutes of the meeting, including the text of the questions (without identifying the source of enquiry) and the responses given will be displayed on e-tendering portal only. Any modifications of the bidding documents which may become necessary as a result of the pre-bid meeting, the same will be made by the Corporation exclusively through the issue of corrigenda/amendments/minutes of the prebid meeting. The corrigenda/amendments/minutes of the prebid meeting shall form a part of the tender and shall be binding on all the bidders.

8.0 Amendment of bid documents:

8.1 At any time prior to the deadline for submission of bids, Corporation may, for any reason, whether at its own initiative, or in response to a clarification requested by a Bidder, amend the bidding documents.

8.2 The corrigenda/amendments/minutes of the prebid meeting will be posted only on the e-tender portal (<https://etenders.gov.in/eprocure/app>) for viewing by the Bidder. Bidders are advised to regularly check the tender on e-tendering portal regarding posting of corrigendum, amendments, minutes of the prebid meeting etc if any. To give Bidders reasonable time to take the corrigendum/amendment/minutes of the prebid meeting into account in preparing their bid, Corporation may, at its discretion, extend the deadline for the sale/download of tender, submission of bids and opening of bids.

9.0 Language of the tender

All documents relating to the tender shall be in the English language, unless stated otherwise. Hindi version of general conditions of contract (GCC) or any part of tender is uploaded on web site is for information purpose only. In case of any contradiction between English and Hindi versions, the English version shall prevail. The Bid, as well as all correspondence and documents relating to the Bid exchanged by the Bidder and the Corporation, shall be written in English language. Supporting documents and printed literature that are part of the Bid may be in another language provided they are accompanied by an accurate translation in English.

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10.0 EMD/Bid security:

10.1 The Corporation shall not pay interest on EMD/Bid Security. The EMD/bid security amount may be paid by the Bidder/Tenderer in any of the modes described below.

- a) Credit / Debit Card
- b) RTGS / NEFT
- c) Online transfer

10.2 The bidder shall note that banks as per standard working practice require a certain time period for completion of transaction. The bidder shall ensure timely submission in order to complete transaction as per tender/bid condition. If the transaction is not completed in favor of NPCIL within the prescribed time, such bid shall be rejected. The bidder is solely responsible for timely deposition of EMD/Bid Security in the correct account so that the Corporation receives the same before stipulated bid submission date and time. Even if the payment made by the bidder within the stipulated date and time is not received by the Corporation due to reasons beyond control of both the bidder and Corporation, bid will be considered as non-responsive and rejected. If the EMD/Bid Security amount paid by bidder is less than stipulated amount, the bid shall be rejected.

10.3 Eligible MSEs, having Udyam registration as specified in clause 25.0 and Startups as specified in clause 32 are exempted from payment of EMD/Bid Security.

Submission of bids by eligible MSE(s)/Startup(s) shall be considered as absolute acceptance to the undertaking that in case the eligible MSE/Startup modify or withdraw bid during the period of validity then such eligible MSE/Startup shall be liable to be banned for business dealings with the Corporation as per clause 26 of Part-2 of this NIT.

10.4 Refund of EMD/Bid Security (in both cases with or without Integrity Pact):

- a) In case of Single part tender, the EMD/Bid Security of unsuccessful bidders shall be refunded within 30 days from the date of issue of work order/Lol (Letter of Intent) to the successful bidder.
- b) In case of two-part tender:
 - i) EMD/Bid Security of techno-commercially unqualified bidders shall be refunded within 30 days from the date of opening of Part-II (Price bid).
 - ii) EMD/Bid Security of qualified unsuccessful bidders will be refunded to them within 30 days of date of issue of work order/Lol to the successful bidder.
- c) EMD/Bid Security of successful bidder will be refunded within 30 days of receipt and acceptance of Performance Guarantee.

In case of tender with Integrity Pact, if Performance Guarantee is waived, EMD/Bid Security of successful bidder will be refunded within 30 days of the completion of the defect liability period (if applicable), or 12 months from the date of the last payment/final bill payment, whichever is later.

- d) EMD/Bid Security of the bidder who has withdrawn the bid before due date for bid submission shall be refunded after opening of the Part-1 (Techno-commercial) Bid in case of two-part tender and after opening of the bid in case of one-part tender.
- e) If the tender is cancelled, EMD/Bid security shall be refunded to all the bidders within 30 days from the date of cancellation of tender.

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- f) EMD/Bid Security of bidder who has not accepted the request for extension of Bid offer validity, will be refunded within 30 days of date of issue of work order /Lol to the successful bidder.
- g) EMD/Bid Security shall be refunded by the Corporation online to the same account from where such payment was received. In case of erroneous details, it will not be possible to refund the EMD/Bid Security online and bidder shall be responsible for consequent delays.

10.5 The EMD/Bid Security may be forfeited, if;

- a) The bidder withdraws/modifies his Bid or any item thereof (without being authorized by NPCIL) after due date for submission of bid and during the stipulated validity period.
- b) The successful bidder fails within the specified time limit to submit the Performance Guarantee.
- c) The bidder fails within the specified time limit to submit documents for verification when requested to do so.
- d) The bidder/his representative has engaged in fraudulent practices /malpractices /unlawful act during submission, evaluation of bid.
- e) In case the bidder / contractor violates any provisions of Integrity Pact, wherever applicable.
- f) The bidder is banned from conducting business with the Corporation in course of this tender.

The bidders who are exempted from paying EMD/Bid Security (eligible ~~MSEs/Startups~~), if default for reasons mentioned in either of clause 10.5 a, b, c, d, e or f, an amount equal to EMD/Bid Security will be deducted from any of the bidder's due available with Corporation. The process for banning of business may also be initiated and the information regarding the default will also be forwarded to the relevant authority of ~~MSEs/Startups~~ with whom the bidder is registered.

11.0 Bid prices, rates & taxes

- 11.1. The bidders shall quote bid price/rates/total bid price in Indian Rupees only unless otherwise specified in the Special Conditions of contract (SCC).
- 11.2. In case of percentage rate tender, bidder must ensure to quote single percentage rate. The rate shall be quoted up to two decimals. In case of Quality cum cost based selection (QCBS) the evaluation shall include the criteria as stipulated in special condition of contract.
- 11.3. In case of item rate tender, rate or price shall be entered against each item in the bill of quantities/schedule of quantities. The item against which the bidder has failed to enter a rate or price shall be deemed to be covered by rates or prices of other items in bill of quantities/schedule of quantities and no payment shall be made for the quantities executed for items against which rate or price has not been quoted by the Bidder. The rate or price shall be quoted up to two decimals of rupees.
- 11.4. The bid price / rates / total bid price quoted shall be inclusive of all statutory liabilities, taxes (including GST), cess, duties, levies, BOCW cess, fees, royalty, commission, costs towards compliance of EPF, ~~ESI~~, other labour laws, applicable insurance, etc as applicable under the prevailing statutes or levy by the statutory authorities/State/UT/Central Government and payable by the bidder.
- 11.5. The bid price / rates / total bid price shall be quoted in the prescribed format given with the required break-up as specified therein. The bidder shall take special care not to mix-up price details with the Part-I (Technical & Commercial e-bid except price) and vice versa. Any violation of these conditions shall lead to rejection of the bid.
- 11.6. Applicable rate of GST (%) shall be quoted at appropriate place in price bid format along with Part 2 or Price Bid. Submission of bid by bidder shall be considered as acceptance of undertaking that bidder is GST compliant and their quoted GST rates are as per GST law.
- 11.7. For the purpose of evaluation the total quoted price (stated as per clause no. 11.4 above) shall only be considered.

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11.8. The statutory deductions of income tax and other taxes/dues (wherever applicable) shall be made from the payments due to the Contractor.

11.9. The bid price / rates / total bid price will be subject to adjustment in accordance with the provisions of General Conditions of Contract (GCC) and Schedule A.

11.10. Conditional bids/offers are liable to be rejected.

11.11. Refer S.C.C. (Special Conditions of Contract) for clause on Taxes and Duties.

12.0 Currency of bid price and payment

12.1 The bid price shall be quoted by the bidder in Indian rupees, unless otherwise specified in the special conditions of contract.

13.0 Bid validity

13.1 The bids submitted shall remain valid for acceptance for a period as stipulated in Schedule A from the date of opening of Part-1 bid. The bidder shall not be entitled during the period of validity, to revoke or cancel his bid or vary / modify the bid In case the bidder withdraw or modify any part of bid, the full amount of bid security shall be forfeited and such bid shall not be considered for evaluation. Further, other actions like Banning of Business Dealings as per tender conditions may also be taken.

13.2 In exceptional circumstances, prior to expiry of the original bid validity period, NPCIL may request the bidders to extend the period of validity for a specified additional period. The request and the responses thereto shall be made in writing. A bidder agreeing to the request will not be permitted to modify its bid, but will be required to extend the validity of its bid security for the period of the extension.

14.0 Alternative proposals by bidders

14.1 Bidders shall upload offers that comply with the requirements of the bidding documents, including the basic technical design as indicated in the drawing and specifications. Alternatives will not be considered.

15.0 Submission of the bids

15.1 Information and Instructions for bidders posted on e-Tendering Portal website shall form part of tender document.

Bidders are advised to confirm with e-Tendering Portal on the restriction of file size and number of files to be uploaded.

Presently as per e-Tendering Portal, the individual file size is to be restricted to 40 MB for uploading the documents.

Due to system limitation of individual file size to be uploaded on e-Tendering Portal, it is suggested to bidders to compress file size or scan using reduced dpi. But clarity and legibility of documents should be maintained

Also, wherever it not essential to submit high-resolution and colour images, bid documents/clarifications/confirmations etc may be scanned with 100dpi with black & white option to reduce size of scanned document.

15.2 After uploading the bid the bidder can modify/ revise and re-upload/re-submit bid any number of times but before stipulated closing time and date of online submission of bid as notified. The bidder shall exercise option for withdrawal of bid with caution since once the bid is withdrawn the same cannot be uploaded and submitted. The modification and withdrawal of bid shall be done on e-tendering portal only. The information in this regard through any other mode of communication will not be entertained.

15.3 The bidders, who are not enrolled/registered on <https://etenders.gov.in/eprocure/app> website,

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are required to get enrolled/registered. The procedure for new enrollment/registration and change is available on the e-Tendering Portal website (<https://etenders.gov.in/eprocure/app>) and the bidder shall be responsible to factor in this time period required for such activity during bidding.

- 15.4** The bid including all documents uploaded in the on-line bid shall be digitally certified by a duly authorized representative of the Bidder using Class-III digital signature (in the name of designated individual with Organization name). The Digital Signature shall be as per Indian IT Act from the licensed Certifying Authorities (CA) operating under the Root Certifying Authority of India (RCAI) namely Controller of Certifying Authorities (CCA) of India.

The bidder may obtain the compatible digital signature from any service provider.

- 15.5** Bidder must ensure to quote rate of each item. If any cell is left blank and no rate is quoted by the bidder, rate of such item shall be treated as "0" (Zero). The bidder shall be required to execute such items at his quoted rate of zero as per specifications, bill of quantity and GCC provisions.

- 15.6** In case of bids in three stage system and if it is desired to upload revised financial bid then it shall be mandatory to upload revised financial bid. If not uploaded then the bid uploaded earlier shall become invalid.

- 15.7** The bidders are responsible to keep their email and bank account active and to update their profile in case of change. This is essential as communication shall be done through e- mail. Moreover, all the auto generated mail by e-tendering portal will be sent on this e-mail address.

- 15.8** The date and time of on-line bid submission shall remain unaltered even if the specified date for the submission of the bid is declared as holiday for the office inviting tender. The server time (which is displayed on the bidders' dashboard) will be considered as the standard time for referencing the deadlines for submission of the bids by the bidders, opening of bids etc. The bidders should follow this time during bid submission.

The system will not allow submitting Bids beyond the stipulated due date and time. Therefore, the bidder shall ensure the submission of e-Bids well within the stipulated due date and time.

The on-line Bid must be uploaded on the system well before the expiry of time and the schedule specified in the tender notifications and may note that there is a time lag between the actual placing the bid on the local computer of the bidder and the refreshing of the data on the server. The processing time for data exchange depends on the internet speed of the bidder, therefore bidder should avoid the last minute hosting of their bid. The bids visible to the Corporation will be final for the purpose of acceptance.

- 15.9** The Corporation may extend the deadline for sale and submission of bids, opening of bid by issuing an amendment, in which case, all rights and obligations of the Corporation and the bidders previously subject to the original deadline will then be subject to the new deadline.

- 15.10** It is binding on the bidder to fill the data required for evaluation of pre-qualification criteria in the excel sheets uploaded for the purpose. Bidders shall not modify the format of excel sheet. The Part-1 evaluation shall be done based on the data provided in excel sheet and the relevant documents uploaded to support the same.

In case where the relevant information is not filled in the uploaded excel sheets while commensurate supporting documents are uploaded, the supporting documents shall not be considered in evaluation. Therefore, the bidders in their own interest shall fill all the relevant information in excel sheets and upload commensurate supporting documents. The bidders shall not write in the excel sheet that information is "as per enclosure/attached annexure", as it will be treated as no information is uploaded/filled and same shall not be considered for evaluation.

- 15.11** The Corporation may ask for clarifications and submission of relevant documents already

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mentioned in excel sheets (Format-1 to Format-8).The request for such clarification and the response shall be in writing. The shortfall information/documents may be sought only in case of historical documents which pre-existed at the time of tender opening and which have not undergone any change since then. However, any new contract which is not mentioned in excel sheet (Format-2) shall not be accepted and considered for evaluation. In case of any mismatch in data submitted in excel sheet and supporting documents submitted, the details in submitted documents shall prevail.

In case of ambiguity or incomplete documents pertaining to PQC, bidders shall be given opportunity with a fixed deadline to provide complete and unambiguous documents in support of meeting the pre-qualification criteria. In case the bidder fails to upload any document or uploads incomplete documents within the given time, the bidder's tender will be evaluated as per available documents. The clarification sought by the Corporation and response submitted by the bidder shall not result into change in the price or substance of the bid, until authorised by the Corporation.

15.12 Corporation reserves the right to call upon the bidder to produce original of all the documents uploaded for qualification purpose for verification at any stage. If the same are not produced in stipulated time, the bid will be rejected.

15.13 Power of attorney of the person uploading the bid under his DSC shall be uploaded along with the bid shall be as per the following:

S. No.	Type of company/legal entity	Document to be uploaded
1	Sole proprietary Concern	<p>a) If the bid is uploaded by the proprietor, no POA (Power of attorney) required. However, he will upload undertaking certifying that he is sole proprietor.</p> <p>b) If the bid is uploaded by person other than proprietor, POA authorising the person to upload bid on behalf of the concern</p>
2	Joint Venture(unincorporated) (JV) (unincorporated) /Consortium	<p>Power of attorney or any other legally acceptable document authorising the person to bid on behalf of the bidder.</p> <p>and</p> <p>Other documents as per clause 30.2.19.</p>
3	Private Company	<p>a) Certified copy of Board Resolution authorising the person uploading the bid on behalf of the company along with Memorandum of Association & Article of Association</p> <p>or</p> <p>b) Power of attorney and the supporting Board Resolution authorising the person uploading the bid on behalf of the company along with Memorandum of Association & Article of Association</p>
4	Partnership Firm	<p>a) Self-attested copy of Registered / Notarized Partnership Deed</p> <p>and</p> <p>b) Power of Attorney duly authorizing one or more of the</p>

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		partners of the firm or any other person(s), authorized by all the partners to act on behalf of the firm
5	LLP (Limited Liability Partnership)	a) Notarized copy of LLP Agreement and b) Notarized copy of Certificate of Incorporation And c) Power of Attorney/Authorization issued by the LLP authorising the person uploading the bid on behalf of the LLP
6	Co-Operative Society/Registered Society/Registered Trust	a) Self-attested copy of the Certificate or Registration and b) Self-attested Deed of Formation and c) Power of Attorney in favor of the Tender Signatory.
7	PSU/Government Autonomous Body/Government Entity	Authorisation letter issued by organization.

16.0 Bid opening

16.1 Bid opening shall be done on-line only. If the date of opening is declared as holiday then bid will be opened on next working day. In exceptional cases opening of tenders can be done on any day or time after scheduled date and time of opening. Witnessing of opening of technical bid & price bid of the tender shall be online on e-tendering portal.

16.2 The bid without stipulated bid security amount / ~~MSE registration certificate/Start-up Registration Certificate~~ shall be summarily rejected.

16.3 In case of two part tenders the status of the bidder qualification in Part-I shall be available only on the e-tendering portal and no separate intimation in this regard will be issued.

Bidders after publication of Part-1 evaluation results on e-Tendering Portal may raise a one-time representation to challenge the evaluation results within allowable duration (i.e., within 2 working days of uploading status of Part 1 Evaluation excluding the day of uploading status of Part 1 Evaluation). The tenderer/bidder is permitted to send his/her representation in writing only by email to designated email as specified in Tender Document. Representation sent to any other email id or by any other mode shall be ignored and shall not be considered.

The documents/clarifications not submitted through Part 1 Clarification window via e-tendering portal within time frame by the bidder shall not considered during representation stage.

Similarly, the intimation regarding date and time of opening of Part-II i.e. financial bid shall be available on the e-tendering portal and no separate intimation in this regard will be issued. The participating bidders will be able to view the bid prices of all the qualified bidders after online opening of Price Bids on the e-tender portal.

17.0 Clarification of bids

17.1 Any effort by the bidder to influence the Corporation's bid evaluation, bid comparison or contract award decisions, may result in the rejection of his bid.

17.2 Canvassing in any form with regard to this tender will lead to rejection of the e-bid.

18.0 Examination of bids and determination of responsiveness

18.1 Prior to detailed evaluation of bids, the Corporation will determine whether each bid(s) fulfills the following:

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- (a) The minimum requirements as per pre- qualification criteria
- (b) is accompanied by the required bid security
- (c) is responsive to the requirements of the bidding documents
- (d) has been properly uploaded by authorized signatory as per clause-15.14.

18.2 A substantively responsive bid is complete and conforms to the bid document's essential terms, conditions, and requirements without material deviation, reservation, or omission. Only substantively responsive bids shall be considered for further evaluation. Corporation reserves its right to consider and allow minor deviations in technical and Commercial Conditions which do not amount to material deviations.

A material deviation or reservation or omission is one

- (a) Which affects in any substantial change in scope, quality or performance of the works.
- (b) Which limits in any substantial way, inconsistent with the bidding document, the Corporation's rights or the bidder's obligations under the contract;
- (c) Whose rectification would affect unfairly the competitive position of other bidders quoting substantially responsive bids.

19.0 Evaluation and comparison of bids

19.1 The Corporation reserves the right to accept or reject any offer. Corporation also reserves the right to award only part of the work or split the work as stipulated in tender document.

19.2 During comparison of price bids, the price adjustment provisions as per tender conditions shall not be taken into account for evaluation of Bids.

19.3 An unbalanced or abnormally low Bid is one in which the bid price, in combination with other elements of the Bid, appears so low that it raises material concern as to the capability of the bidder to perform contract at the offered price. Corporation in such cases may seek written clarification from bidder, including detailed analysis of its bid price in relation to scope, schedule, allocation of risk and responsibilities, and any other requirements of the bid document. If, after evaluating the price analysis, Corporation determines that the bidder has substantially failed to demonstrate its capability to deliver the contract at offered price, the Corporation may reject such bid.

In case of Contracts where minimum manpower requirement is specified in tender document, if bid price quoted by bidder is less than that required for ensuring compliance with statutory requirements/norms as applicable like payment of minimum wages, EPF, ~~ESI~~, Bonus as applicable then it shall be summarily rejected.

19.4 Any acceptable deviation in the commercial terms only shall be suitably loaded at the time of evaluation.

20.0 Criteria for award of work

20.1 The Corporation shall award the contract to the bidder whose evaluated offer / bid has been determined to be the techno-commercially qualified and financially lowest (L1) and is responsive to the tender document. The technically and financially suitable bids in other types of bids shall be decided as per criteria given in bid evaluation criteria. In case of tie between two lowest bidders, both the bidders shall be given a chance to offer rebate to decide the lowest bid. If the situation still remains same the lottery shall be adopted to decide the award.

20.2 The techno-commercially qualified and financially lowest (L-1) bidder or Highest combined weighted score for Quality and Cost i.e., H-1 Bidder (in case of QCBS evaluation) shall submit notarized photocopies of all the documents which were submitted with the bid for evaluation of

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qualification any time before the issue of Work Order. If the documents are not produced in stipulated time, the bid may be rejected.

- 20.3** The Corporation reserves the right not to award the whole or part of work without assigning reason and without incurring any liability to the bidder or bidders.
- 20.4** If the work is required to be re-tendered due to L-I bidder or Highest combined weighted score for Quality and Cost i.e., H-1 Bidder (in case of QCBS evaluation) backing out, then the bidder who has backed out will not be permitted to participate in the re-tender and may be banned from business with Corporation.
- 20.5** In case of risk purchase, the contractor against whom the risk and cost is being adjusted stands disqualified from participation in this tender.
- 20.6** If before issuing letter of intent or work order it is ascertained that L-1 or Highest combined weighted score for Quality and Cost i.e. H-1 Bidder (in case of QCBS evaluation) bidder is insolvent or has submitted forged documents, the bidder shall be considered as techno-commercially disqualified. The award process shall be continued by excluding the techno-commercially disqualified bidder.
- 20.7** The bidder in exceptional circumstances may be called for negotiation. In the event of failure of negotiation, the original tender submitted by bidder shall remain open for acceptance on its original terms and conditions.

21.0 Notification of award

- 21.1** The bidder whose bid has been accepted will be notified of the award by the Corporation prior to expiration of the bid validity period by issue of work order. The notification may also be made through letter of intent (Appendix-8), wherein the work order shall follow. The successful bidder shall submit the requested documents as mentioned in letter of intent within stipulated time, failing which the award of work is liable to be cancelled and bid security shall be forfeited. Further action for banning of business may also be taken.
- 21.2** The outcome of award can be seen on e-tendering web site (<https://etenders.gov.in/eprocure/app>).
- 21.3** After award of work, an agreement shall be made and signed by both the parties. The agreement shall comprise of tender document as uploaded on e-tendering portal, letter of intent/ work order and all correspondence between the Corporation and the successful bidder, upto acceptance of work order by bidder. The successful bidder shall be responsible for compliance at his own cost with the stamp duty act of the state where the agreement is being executed. The non-judicial stamp paper of appropriate value shall be submitted by the successful bidder at his own cost.

22.0 Corrupt or fraudulent practices

- 22.1** The Corporation requires that bidders / suppliers / contractors under this contract shall observe the highest standard of ethics during the procurement and execution of this contract. In pursuance of this policy, the Corporation:

- (a) defines, for the purpose of these provisions, the terms set forth below as follows:
- (i) "corrupt practice" means the offering, giving, receiving or soliciting of anything of value to influence the action of a public official in the procurement process or in contract execution; and
- (ii) "fraudulent practice" means a misrepresentation of facts in order to influence a procurement process or the execution of a contract to the detriment of the Corporation, and includes collusive practice among bidders (prior to or after bid submission) designed to establish bid prices at artificial non-competitive levels and to deprive the Corporation of the benefits of free and open competition.

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- (b) will reject award of work if it determines that the bidder recommended for award has engaged in corrupt or fraudulent practices in competing for the contract in question.
- (c) will declare a bidder ineligible for a stated period of time, to be awarded a contract/contracts if at any time it determines that the bidder has engaged in corrupt or fraudulent practices in competing for, or in executing, the contract.

22.2 The bidder may make representation in connection with processing of tender directly and only to the designated email as mentioned in the tender document. However, if such representation is found to be un-sustentative and/ or frivolous and if the tender has to be closed because of the delays / disruptions caused by such representations and the job has to be re-tendered, then such bidder will not be allowed to participate in the re-invited tender.

In case, any bidder while making such representation to competent authority also involves other officials of Corporation and / or solicits/ invokes external intervention other than as may be permitted under the law and if the tender has to be closed because of the delays / disruptions caused by such interventions and has to be re-tendered, then the particular bidder will not be allowed to participate in the re-invited tender.

23.0 Disclosures

Any change in the constitution of the contractor's firm, as declared in the bid should be disclosed to the Corporation, at any time starting from submission of bids till the currency of contract.

24.0 Fiscal Concessions in View of Mega Power Project Status

With reference to Custom Notification No. 02/2022 dated 01/02/2022, the Fiscal Concession to Nuclear Power Projects (NPPs) will not be available after 30/09/2025 (Custom Notification No. 54/2023 Dated: 14.07.2023) subject to registration of contract with appropriate Custom House before 30/09/2022. The Bidders shall submit their offer, taking into consideration the above Custom Notification.

Custom duty, if applicable shall be borne by the bidder. Accordingly, the bid price shall be inclusive of custom duty.

In case any fiscal concessions in this regard are available at later date, the same shall be passed on to the Corporation.

25.0 Benefits of Public Procurement Policy for Micro & Small Enterprises (MSEs) under Micro, Small and Medium Enterprises Development Act, 2006.(Not Applicable)

~~The applicability of this clause shall be as defined in schedule –A regarding exemption/relaxation from meeting the qualification criteria in respect of prior experience and financial criteria viz. (Turnover, Profit before Tax, Bid Capacity, Solvency/Net Worth/Credit Rating/Line of Credit), exemption from submitting bid security, Purchase preference to MSE registered bidders and splitting of quantity for award to MSE.~~

~~Any notification of Govt. of India in this regard shall supersede the provisions of this clause.~~

~~In case of an upward change in terms of investment in plant and machinery or equipment or turnover or both, and consequent re-classification, an enterprise shall continue to avail of all non-tax benefits of the category it was in before the re-classification, for a period of three years from the date of such upward change. Non-tax benefits include benefits of various schemes of the Government, including Public Procurement Policy, Delayed Payments, etc.~~

~~In case of exemption/relaxation from meeting the qualification criteria in respect of prior experience and financial criteria viz. (Turnover, Profit before Tax, Bid Capacity Solvency/Net Worth/Credit Rating/Line of Credit), the clause stipulating meeting of quality and technical~~

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specifications shall be as specified in Schedule A for eligible MSE(s).

- 25.1** ~~The benefits of the Public Procurement Policies applicable to MSE(s) shall be given to all eligible MSE(s) irrespective of relevance of product Categories and irrespective the category they are registered under viz. Manufacturing or Service however, such MSE(s) shall be registered under Udyam Registration.~~

~~(Reference: FAQ no. 3& FAQ no. 29 circulated vide Office Memorandum F. No. 1(3)/2018-MA Part III Dated 25/03/2022).~~

- 25.2** ~~The Micro and Small Enterprises (MSEs) having a valid Udyam Registration certificate are exempted from payment of bid security. Failing submission of Udyam Registration certificate by eligible MSE bidder, the bid shall be considered as without bid security and non-responsive.~~

- 25.3** ~~Purchase Preference to Micro and Small Enterprises (MSEs) for Supply of Goods or Services will be given as per Public Procurement Policy for Micro & Small Enterprises (MSEs), order 2012 and Amendment order, 2018 under Micro, Small and Medium Enterprises Development Act, 2006 of Government of India or as amended from time to time, in force at the time of submission of bids provided their bids are in compliance with the conditions of policy.~~

~~In addition, Purchase Preference to eligible Micro and Small Enterprises (MSEs) will be governed as per OM No.F.1/4/2021-PPD dtd. 18-05-2023(Concurrent application of Public Procurement Policy for Micro & Small Enterprises Order, 2012 and Public Procurement (Preference to Make in India) Order, 2017)) or as amended from time to time, in force at the time of submission of bids.~~

- 25.4** ~~The benefits of the Public Procurement Policies applicable to MSE(s) is not applicable for works contracts. As per answer to FAQ no. 18 circulated vide Office Memorandum F. No. 1(3)/2018-MA Part III Dated 25.03.2022 "Policy is meant for procurement of goods produced and services rendered by MSEs. However, traders/resellers/distributors/sole agent/Works Contract are excluded from the purview of Public Procurement Policy for MSEs Order, 2012."~~

- 25.5** ~~In case of manual mode, tender sets shall be provided free of cost to the eligible Micro and Small enterprises (MSEs) having a valid Udyam registration Certificate. In case of any change in the MSE status of the Bidder, it shall be the responsibility of the Bidder to notify the change. If at a later date it comes to the knowledge of Corporation, that the change in the status has not been intimated by the Bidder and the order is obtained under the premise of an MSE then Corporation may cancel the pending order against this tender and may take necessary steps for Banning of the business dealing with the Bidder.~~

- 25.6** ~~In case of tenders where splitting of quantity is defined in the bid document, participating Micro and Small Enterprise (MSE) quoting price within price band of L1 + 15 percent shall also be allowed to supply a portion of requirement by bringing down their price to L1 price in a situation where L1 price is from someone other than a MSE and such MSE shall be allowed to supply up to 25% of total tendered value. In case of more than one such MSE, the supply will be shared proportionately (to tendered quantity).~~

- 25.7** ~~In case of tenders where splitting of quantity is not possible, participating MSEs quoting price within price band of L1 +15 percent shall be allowed to execute the work by bringing down their price to L1 price in a situation where L1 price is from someone other than a Micro and Small Enterprise. The award shall be made as follows:~~

- ~~a) Award shall be given to L1 bidder if L1 bidder is a MSE.~~
- ~~b) In case L1 bidder is not a MSE, then all the MSE vendor(s) who have quoted within the range of L1 + 15%, shall be given the opportunity in order of their ranking (starting with the lowest quoted MSE bidder and so on) to bring down its price to match with L1 bidder. Award shall be placed on the MSE vendor who matches the price quoted~~

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by L1 bidder.

- c) ~~If the MSE Bidder is ready to match total bid price of overall L1 Bidder by offering suitable percentage discount, then that shall be applied to all item rates.~~
- d) ~~If no MSE vendor who has quoted within range of L1 + 15% accepts the price of L1 bidder then the award shall be made to the L1 bidder.~~

25.8 ~~The bidder on whom the contract may be entered into against this tender shall furnish the Corporation, the details of the sub-contractors meeting any part of contract execution herein and who qualify as MSE's as per the Micro, Small and Medium Enterprises Development Act, 2006 and amendments to same.~~

26.0 Banning of business dealings by Corporation

The words banning, blacklisting, de-registered, debarred, holiday, suspension of business etc., means the same.

26.1 Grounds for Banning

The business dealing with the Contractor shall be liable for banning, on account of the reasons attributable to them, which shall include, but not limited to the following:

- 26.1.1** Involvement in cartel formation during bidding.
- 26.1.2** Baseless allegations by the bidder on NPCIL evaluation processes or officials.
- 26.1.3** If any of the owner, proprietor or partner of the Contractor, is convicted by a court of law, during bidding process or currency of the contract, for offences involving corrupt and fraudulent practices including misrepresentation of the facts, moral turpitude in relation to its business dealings with NPCIL.
- 26.1.4** Malafide / unlawful acts / malpractices or improper conduct on part of Contractor based on the approved findings of the Investigation Agency.
- 26.1.5** If the Contractor misuses the premises or facilities of the NPCIL forcefully occupies, tampers or damages the Company's properties etc. or fails to vacate the properties/land/complex within reasonable time limit as specified or even after receiving the notices from the department.
- 26.1.6** Security concerns for the assets of the Corporation and State.
- 26.1.7** Submission of bids that contain false information or falsified documents or the concealment of such information in the bids in order to influence the outcome of eligibility screening or / at any other stage of the public bidding and execution.
- 26.1.8** Withdrawal of a bid or refusal to accept an award of contract with the NPCIL without justifiable cause, after being adjudged as the successful bidder.
- 26.1.9** Supply of Counterfeit items
- 26.1.10** Breach of Code of Integrity.

Bidder shall not act in contravention of the codes which includes

26.1.10.1 Prohibition of

- a. Making offer, solicitation or acceptance of bribe, reward or gift or any material benefit, either directly or indirectly, in exchange for an unfair advantage in the procurement process or to otherwise influence the procurement process.
- b. Any omission or misrepresentation that may mislead or attempt to mislead so that financial or other benefit may be obtained or an obligation avoided.

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- c. Any conclusion, bid rigging or anticompetitive behavior that may impair the transparency, fairness and the progress of the procurement process.
- d. Improper use of information provided by the procuring entity to the bidder with an intent to gain unfair advantage in the procurement process or for personal gain.
- e. Any financial or business transactions between the bidder and any official of the procuring entity related to tender or execution process of contract; which can affect the decision of the procuring entity directly or indirectly.
- f. Any coercion or any threat to impair or harm, directly or indirectly, any party or its property to influence the procurement process.
- g. Obstruction of any investigation or auditing of a procurement process.
- h. Making false declaration or providing false information for participation in tender process or to secure a contract;

26.1.10.2 Disclosure of conflict of interest

- 26.1.10.3** Disclosure by the bidder of any previous transgression made in respect of the provisions of above **26.1.10.1** with any entity in any country during the last three years or of being debarred/ banned by any other procuring entity.

26.2 Show Cause Notice

- 26.2.1** NPCIL will issue Show Cause Notice to the Contractor on noticing/receipt of a complaint of any irregularities and /or misconduct and /or unethical practice as mentioned in clause no. 26.1.
- 26.2.2** Upon receipt of Show cause notice, the Contractor is required to submit the reply to Show Cause Notice within 30 days of its receipt and no extension shall be given without justifiable reasons. The Contractor shall also be given an opportunity for oral hearing to present the case in person to NPCIL and the date of Oral Hearing will be indicated in the Show Cause Notice. Only the regular employees of Contractor will be permitted to represent the Contractor during the Oral hearing, and no outsider shall be allowed to represent the Contractor on their behalf.

26.3 Period of Banning

The period of banning shall be for a period of not exceeding 2 (two) years and not less than 6 (six) months as considered appropriate by NPCIL.

26.4 Effect of Banning of Business Dealings by NPCIL

In case NPCIL has banned the business dealing with the bidder/contractor, the following shall be the consequences on issuance of the order of banning of business dealings with the bidder/contractor:

- 26.4.1** No Contract of any kind whatsoever shall be placed to such banned firms including its allied firms after the issue of Banning Order by NPCIL. The Contractor including their allied firms shall not be allowed to participate in any tender enquiry till completion of Banning period. If the Contractor has already participated in tender process and the price bids are not opened, his techno-commercial bid will be rejected and price bid will be kept unopened. In cases, where the price bids of Contractor have been opened prior to the order of banning, such bids shall be rejected. However, incase such banned Contractor is Lowest (L1), next lowest firm shall be considered as L1. Bid Security, if any, submitted by such banned Contractors shall be returned to the bidder. Even, in the case of Risk Purchase, no contract should be placed on Debarred/ Banned Contractors.

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- 26.4.2** Contractors shall not be permitted to participate in any business process in any form or entity i.e., as an Associate/Collaborator/Joint Venture Partner/Consortium Partner of the Main Contractor even if the banning order is passed subsequent to opening of Part-I bids.
- 26.4.3** Contractor shall not be allowed to participate as Sub-Vendor/sub-contractor in the tenders for contracts for works, service, supplies.
- 26.4.4** Even if, the banned Contractor is an approved Sub-vendor under any Contract for such equipment/component/service, the Main Contractor shall not be permitted to place work order/Purchase order/Service Contract on the banned Contractor as a sub-vendor after the date of banning even though the name of the party has been approved as a sub-vendor prior to the order of banning.
- 26.4.5** The completion certificate issued to the contractor shall make a mention regarding banning during execution of the contract.
- 26.4.6** Banned bidders shall not be permitted to submit their bid. The bid submitted by the banned bidder shall be summarily rejected.
- 26.4.7** Contracts concluded before the issue of the banning order shall, not be affected by the banning order.
- 26.4.8** Banning shall automatically be extended to all Allied firms of the Contractor. In case of Joint venture/ Consortium is banned all partners will also stand debarred for the period specified in the Banning Order. The names of all partners should be clearly specified in the "Banning order".
- 26.4.9** Banning in any manner does not impact any other contractual or other legal rights of NPCIL.
- 26.4.10** Banning under the provisions of Banning of Business Dealings of NPCIL is applicable only for NPCIL.

26.5 Definition of Allied Firm:

Allied Firm means all concerns which come within the sphere of effective influence of the banned firm. In determining this, the following factors shall be taken into consideration:

- a) Whether the management is common;
- b) Majority interest in the management is held by the partners or directors of banned/ suspended firm;
- c) Substantial or majority shares are owned by the banned/ suspended firm and by virtue of this it has a controlling voice;
- d) Directly or indirectly controls, or is controlled by or is under common control with another bidder;
- e) All successor firms will also be considered allied firms.

27.0 Integrity pact (IP)

The applicability of Integrity Pact (IP) is defined in defined in Schedule-A.

NPCIL is committed to follow the principle of transparency, equity and competitiveness in public procurement of works and/or services. **The submission of bid by bidder shall be considered as an unconditional and absolute acceptance of integrity pact enclosed with the bid document as per Appendix-2.** The submission of bid shall constitute a binding integrity pact as per the enclosed format as per Appendix-2 between the bidder and Authority calling the tender on behalf of Corporation. The bidder will stand disqualified from the bidding process and the bid of the bidder would be summarily rejected in case of non-acceptance of Integrity Pact.

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- (i) IP essentially envisages an agreement between the prospective Bidder/ Contractor and NPCIL committing the persons / officials of both the parties, not to exercise any corrupt influence on any aspect of the contract.
- (ii) Only those Bidder/ Contractor who enter into such an IP with NPCIL would be competent to participate in the bidding.
- (iii) The IP would be effective from the stage of invitation of bids i.e. publish of tender on e-tendering portal till the complete execution of the contract. This pact begins with the submission of Bid by Bidder. The validity of this Integrity Pact shall be from the date of the submission of Bid and it shall remain valid during the entire currency of the contract, including the period of extension if any and the defect liability period after the work is completed to the satisfaction of both the Principal/Owner/Corporation and the Bidder/Contractor or or 12 months from the date of the last payment/final bill payment, whichever is later.

Incase the Bidder/Contractor is unsuccessful, this Integrity Pact shall expire after six months from the date of signing of the contract with successful Bidder.

- (iv) NPCIL has appointed Independent External Monitors (IEMs), the role of IEMs is advisory and it is restricted to resolving issues raised by an intending bidder regarding any aspect of the tender which allegedly restricts competition or bias towards some bidder. The details with respect to the IEM are available on NPCIL Corporate website, i.e., www.npcil.nic.in. Only matters related to Integrity Pact be addressed to IEMs and not routine tender related matters.

(v) Integrity Pact Security:

This clause is also governed by provisions of clause no. 4.2.11 of GCC.

- a) The EMD/Bid Security submitted for the tender shall also be considered as IP Security. No separate submission of Integrity Pact Security is required at the time of submission of bid. The EMD/Bid Security shall be forfeited for any violation of IP.
- b) In case of successful bidder to whom the Contract is awarded, after the release of the EMD, the SD (i.e., Performance Guarantee plus available Retention Money) will serve the purpose of Integrity Pact Security seamlessly during execution of Contract and till the completion of the defect liability period (if applicable), or 12 months from the date of the last payment/final bill payment, whichever is later. In such case, for any violation/breach of the Integrity Pact by the Contractor, the SD (i.e., Performance Guarantee plus available Retention Money), shall be forfeited.

The Contractor shall initially submit Performance Guarantee, as per relevant clauses of Contract to start with. However, the Contractor will also be required to extend the validity of Performance Guarantee, till validity of the IP if required. The Performance Guarantee and Retention Money will be released after completion of the defect liability period (if applicable), or 12 months from the date of the last payment/final bill payment, whichever is later.

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The EMD/Bid Security submitted by the bidders who does not qualify for the tender and qualified unsuccessful bidders shall be returned to the respective bidders as per conditions stipulated under the clause no. 10 of Part 2 of NIT (“EMD/Bid Security”).

28.0 BOCW act

The applicability of BOCW act is defined in schedule –A.

The contractor must get themselves registered from the Registering Office under Section-7 of the “Building and Other Construction Workers Act, 1996” and rules made thereto by the concerned State Govt. and submit certificate of Registration issued from the Registering Officer of the concerned State Govt. (Labour Dept.). The contractor shall be responsible for depositing the requisite cess to the appropriate Government authority and submit the proof.

Should there be any lapse on the part of the contractor and if for any reason, the principal employer is held liable to discharge dues/penalty/fines, if any, the contractor shall be held responsible and that amount shall be deducted from any of his dues payable by Corporation under this contract or any other contract with the Corporation.

29.0 ESIC (Not Applicable)

~~The applicability of ESI act is defined in schedule –A.~~

~~The Bidder shall upload proof of having valid ESI registration for employees located in the ESI implemented areas for every employee before his/her engagement on the Corporation site of works as per requirement of ESI act, 1948 made there under.~~

~~The contractor is required to comply with all the relevant provisions of ESI act, 1948 as amended from time to time and deposit his contribution as may be required under the above said act to the ESI authorities at required intervals / time of deposit and submit the proof to Corporation.~~

~~The contractor by submission of bid agrees to indemnify Corporation harmless against all claims, damages or compensation under the provision of ESI Act, 1948 or any modifications thereof or as consequence of any accident or injury to any workman or other persons in or about the works, whether in the employment of the contractor or not, against all costs, charges and expenses of any suit, action or proceedings arising out of such incident or injury and against all sum or sums which may with the consent of the contractor be paid to compromise or Compound any such claim.~~

~~Should there be any lapse on the part of the contractor and if for any reason, the principal employer is held liable to discharge dues/penalty/fines, if any, the contractor shall be held responsible and that amount shall be deducted from any of his dues payable by Corporation under this contract or any other contract with the Corporation.~~

30.0 JOINT- VENTURE/ Consortium

The use of word Joint Venture(s) /JV anywhere in this clause refers to “unincorporated Joint Venture(s)/JV”.

Joint ventures (JV) / Consortium shall be allowed as stipulated in Schedule A.

30.1

The intending JV/Consortium shall upload a copy of Memorandum of Understanding (MOU) executed by all members along with the bid. The complete details of the members of the JV/Consortium, their share and responsibility in the JV/Consortium etc. particularly with reference to financial, technical and other obligations shall be furnished in the enclosed MOU format (Appendix-1).

The format of Appendix-1 is a sample format and the JV/Consortium partners may modify suitably, however the major aspects like share of interest, division of responsibility, joint and several responsibility etc should invariably be covered in the MOU.

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- 30.2** Once the bid is uploaded, the MOU shall not be modified/alterd/ terminated during the validity of the bid. In case the tenderer/bidder fails to observe / comply with this stipulation, such bid shall be rejected and the full bid security shall be forfeited. In case of successful tenderer/bidder, the validity of this MOU shall be extended till the currency of the contract expires.
- 30.3** Approval of any change of constitution of JV/Consortium shall be at the sole discretion of the Corporation. The constitution of the JV/Consortium shall not be allowed to be modified after submission of the bid by the JV/Consortium except when modification becomes inevitable due to succession laws etc and in any case the minimum eligibility criteria should not get vitiated.
- 30.4** Similarly, after the contract is awarded, the constitution of JV/Consortium shall not be allowed to be altered during the currency of contract except when modification become inevitable due to succession laws etc., and in any case the minimum eligibility criteria should not be vitiated. Failure to observe this stipulation shall be deemed to be breach of contract with all consequential penal action as per contract conditions.
- 30.5** On award of contract, JV/Consortium shall submit a single Performance Guarantee as per tender conditions. All the Guarantees like Performance Guarantee, Bank Guarantee for Mobilization advance, machinery advance etc. shall be accepted only in the name of JV/Consortium and no splitting of guarantees amongst the members of JV/Consortium shall be permitted.
- 30.6** On issue of work order, an agreement among the members of the JV/Consortium (to whom the work has been awarded) has to be executed. This agreement shall be submitted by the JV/Consortium to NPCIL before signing the contract agreement for the work. In case the tenderer/bidder fails to observe / comply with this stipulation, such bids shall be rejected and the full bid security shall be forfeited and other penal actions due shall be taken against the partners of the JV/Consortium and the JV/Consortium as per tender conditions.
- 30.7 Joint and several liability:** The members of the JV/Consortium to which the contract is awarded, shall be jointly and severally liable to the Corporation for execution of the work in accordance with conditions mentioned in Bid Document. The JV/Consortium members shall also be liable jointly and severally for the loss, damages caused to NPCIL during the course of execution of the contract or due to non-execution of the contract or part thereof.
- 30.8 Duration of the Joint Venture/Consortium Agreement:** It shall be valid during the entire currency of the contract including the period of extension if any and the defect liability period after the work is completed.
- 30.9 Governing Laws:** The Joint Venture/ Consortium Agreement shall in all respect be governed by and interpreted in accordance with Indian Laws.
- 30.10 Authorized Member:** Joint Venture/Consortium members shall authorize the lead member on behalf of the Joint Venture/Consortium to deal with the tender/bid, negotiation, sign the agreement or enter into contract in respect of the said bid, to receive payment, to witness joint measurement of work done, to sign measurement books, resolution of disputes, arbitration and all other actions in respect of the said tender / contract. All notices/correspondences with respect to the contract would be sent only to this authorized member of the JV/ Consortium. All communications with the Corporation from the JV/Consortium shall be sent by the lead partner only.

The leader/lead member of the JV/Consortium on behalf of the JV/consortium shall co-ordinate with NPCIL's authorised officer(s) only, during the period while the tender is under evaluation, as well as during the execution of work. He shall also be responsible for resolving disputes / misunderstanding / undefined activities, if any, amongst all consortium members.

Any correspondence exchanged with the leader of the consortium shall be binding on all consortium members.

- 30.11** No member of the Joint Venture/ Consortium shall have the right to assign or transfer his rights or liability in the contract without the written consent of the other members and that of the Corporation in respect of the said tender / contract.
- 30.12** Documents to be enclosed by the JV/Consortium along with the tender/bid:

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- 30.12.1** In case of one or more of the members of the JV/Consortium is / are partnership firm(s), following documents shall be uploaded:
- Notary certified copy of the Partnership Deed.
 - Consent of all the partners to enter into the Joint Venture/Consortium Agreement on a stamp paper of appropriate value.
 - Power of Authority (duly registered as per prevailing law) in favour of one of the partners to sign the MOU and JV/Consortium Agreement on behalf of all the partners and create liability against the firm.
- 30.12.2** In case of one or more members is/are Proprietary Firm or HUF, the following documents shall be enclosed:
Affidavit on Stamp Paper of appropriate value declaring that his Concern is a Proprietary Concern and he is sole proprietor of the Concern or he is in position of "KARTA" of Hindu Undivided Family (HUF) and he has the authority, power and consent given by other members to act on behalf of HUF.
- 30.12.3** In case one or more members is/are limited companies, the following documents shall be uploaded:
- Notary certified copy of resolutions of the Directors of the Company, permitting the company to enter into a JV/Consortium agreement, authorizing MD or one the Directors or Managers of the Company to sign MOU, JV/Consortium agreement, such other documents required to be signed on behalf of the company and enter into liability against the company and / or do any other act on behalf of the company.
 - Copy of Memorandum and articles of Association of the Company.
 - Power of Attorney (duly registered as per prevailing law) by the Company authorizing the person to do/act mentioned in the para (a) above.
- 30.13** By submission of bid, all the members of the JV/Consortium shall certify that they presently are not black listed, banned or debarred or any other term meaning the same by NPCIL or any other Competent Authority restricting the members of the JV/Consortium from participating in tenders/contracts of Govt or CPSEs and applicable to NPCIL as on date of submission of the bids, either in their individual capacity or the JV/ Consortium or partnership firm in which they were members / partners.

31.0 Employee – Employer Relationship

- 31.1** Contractor shall engage personnel who are in its opinion competent, possess suitable experience and are honest and trustworthy. The contractor shall on his own select, recruit and employ its workforce and the Corporation shall in no manner be associated with this process. The contractor will maintain and show the Corporation on demand all employment documents (like appointment letter, bio-data, I-card etc.) in respect of his employees. The contractor shall be solely responsible for all acts of omission or commission and conduct of his employees.
- 31.2** Employees appointed by the contractor shall not be construed under any circumstances to be working under Corporation. The employees engaged by the contractor will have no claim or right whatsoever to be absorbed in the employment of the Corporation at any time or under any circumstances or for any reason whatsoever. The contractor shall be solely liable for the employment or non-employment of his workforce. In case, any dispute is raised by contractor's employee, the contractor shall personally defend and indemnify the Corporation harmless in respect of any consequence thereof.
- 31.3** The contractor shall maintain all records / registers / books as may be statutorily required by laws / regulation and shall produce the same for inspection of Corporation as and when required.
- 31.4** The contractor or his supervisor (site-in-charge) shall maintain record of all employees engaged in the work and shall maintain attendance records.
- 31.5** In case of Contracts where minimum manpower requirement is specified in tender document,

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minimum number of Supervisor to be deployed shall be as per Schedule-A. The supervisor shall be responsible for liaison with the officials of principal employer. If in the opinion of the Corporation any supervisor is found unsuitable, the contractor shall change such supervisor. The Contractor himself shall not be permitted to act as supervisor.

- 31.6** The contractor shall credit the wages directly only into the Bank Account of his employees.
- 31.7** Discipline of the employees of the contractor in the discharge of duties must be regulated by the contractor or his supervisor.
- 31.8** The duty roster/leave of the employees of contractor shall be sanctioned by the contractor or his supervisor. The contractor shall be responsible for maintaining all the records in respect of the employees.
- 31.9** The contractor shall submit an undertaking as per Appendix-7 along with each RA Bill that wages have been paid to his employees and the contribution (along with proof of deposits) has been deposited as per the Employees Provident Funds & Miscellaneous Provision Act. Should there be any lapse on the part of the contractor and if for any reason, the principal employer is held liable to discharge penalty / fines, if any, the contractor shall be held responsible and that amount shall be deducted from any of his dues payable by Corporation under this contract or any other contract with the Corporation.
- 31.10** The contractor shall not involve Corporation in any settlement process in case of labor dispute.

32.0 Startup (Not Applicable)

~~The applicability of this clause shall be as defined in schedule A regarding exemption/relaxation from meeting the qualification criteria in respect of prior experience and financial criteria viz. (Turnover, Profit before Tax, Bid Capacity Solvency/Net Worth/Credit Rating/Line of Credit) subject to meeting of quality and technical specifications and exemption from submitting bid security.~~

~~Any notification of Govt. of India in this regard shall supersede the provisions of this clause.~~

~~In case of exemption/relaxation from meeting the qualification criteria in respect of prior experience and financial criteria viz. (Turnover, Profit before Tax, Bid Capacity Solvency/Net Worth/Credit Rating/Line of Credit), the clause stipulating meeting of quality and technical specifications shall be as specified in Schedule A for eligible Startup(s).~~

~~The bidders expressing desire for availing benefit of exemption/relaxation from meeting the qualification criteria in respect of prior experience and financial criteria viz. (Turnover, Profit before Tax, Bid Capacity Solvency/Net Worth/Credit Rating/Line of Credit) subject to meeting of quality and technical specifications and exemption from submitting bid security under Start-up India Initiatives are required to submit the "Certificate of Recognition" issued by DIPP (Department of Industrial Policy & Promotion or DPIIT (Department for Promotion of Industry and Internal Trade), Ministry of Commerce & Industry.~~

33.0 Public Procurement (preference to Make in India) Order 2017:

Purchase Preference will be given to eligible bidders in accordance with the "Public Procurement (preference to make in India) Order 2017" issued by Department of Industrial Policy and Promotion (now Department for Promotion of Industry and Internal Trade, DPIIT), Ministry of Commerce and Industry, Government of India vide No - P-45021/2/2017-PP (B.E.-II) dated 15/06/2017, as amended from time to time and as applicable on the date of submission of bid, herein after referred as "PPP-MII Order 2017". The minimum local content for the items covered under this tender shall be as per nodal Ministry's Order in this regard. The margin of purchase preference and procedure of purchase preference shall be as specified in the "PPP-MII Order 2017". For divisibility/non divisibility of scope of work refer to Schedule A.

In addition, Purchase Preference to eligible Class I Local Supplier will be governed as per OM No.F.1/4/2021-PPD dtd. 18-05-2023(Concurrent application of Public Procurement Policy for

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Micro & Small Enterprises Order, 2012 and Public Procurement (Preference to Make in India) Order, 2017) or as amended from time to time, in force at the time of submission of bids.

Any notification of Govt. of India in this regard shall supersede the provisions of this clause.

Eligibility of Class-I, Class-II Local Supplier as per “PPP-MII Order 2017” for participation under this tender shall be as stipulated in Schedule-A.

Verification of Local Content

The ‘Class-I local supplier’/ ‘Class-II local supplier’ at the time of tender, bidding or solicitation shall be required to indicate percentage of local content and provide self-certification that the item offered meets the local content requirement for ‘Class-I local supplier’/ ‘Class-II local supplier’, as the case may be. They shall also give details of the location(s) at which the local value addition is/will be made.

In cases of procurement for a value in excess of Rs. 10 crores, the ‘Class-I local supplier’/ ‘Class-II local supplier’ shall be required to provide a certificate from the statutory auditor or cost auditor of the company (in the case of companies) or from a practicing cost accountant or practicing chartered accountant (in respect of suppliers other than companies) giving the percentage of local content and place of value addition.

34.0 Conditions on Public Procurement from certain countries:

Provisions of F. No. 6/18/2019-PPD Order (Public Procurement No. 1) dated 23.07.2020 and Order (Public Procurement No. 2) dated 23.07.2020 issued by Public Procurement Division, Department of Expenditure, Ministry of Finance, Govt. of India shall be applicable to all tenders issued by NPCIL. Bidders shall apprise and acquaint themselves with the latest provisions of these provisions, as applicable on the date of submission of the tender/bid.

For ready reference, some of the important provisions as applicable currently are mentioned herein below. For sake of clarity, it is reiterated that this is not exhaustive list and it shall be responsibility of the bidder to ensure compliance to the latest provision in this regards. In case of any conflict between clauses written herein below with the above order(s), as amended from time to time, the provisions of order/ latest version shall govern.

- I. Any bidder from a country which shares a land border with India will be eligible to bid in this tender only if the bidder is registered with the Competent Authority.
- II. “Bidder” (including the term ‘tenderer’, ‘consultant’ or ‘service provider’ in certain contexts) means any person or firm or company, including any member of a consortium or joint venture (that is an association of several persons, or firms or companies), every artificial judicial person not falling in any of the descriptions of bidders stated hereinbefore, including any agency branch or office controlled by such person, participating in a procurement process.
- III. “Bidder from a country which shares a land border with India” for the purpose of this order means:
 - a. An entity incorporated, established or registered in such a country; or
 - b. A subsidiary of an entity incorporated, established or registered in such a country; or
 - c. An entity substantially controlled through entity incorporated, established or registered in such a country; or
 - d. An entity whose beneficial owner is situated in such a country; or
 - e. An Indian (or other) agent of such an entity; or
 - f. A natural person who is citizen of such a country; or
 - g. A Consortium or Joint Venture where any member of the consortium or joint venture falls under any of the above
- IV. The beneficial owner for the purpose of (iii) above will be as under:

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1. In case of a company or Limited Liability Partnership, the beneficial owner is the natural person(s), who, whether acting alone or together, or through one or more judicial person, has a controlling ownership interest or who exercises control through other means.
Explanation –
 - a. “Controlling Ownership Interest” means ownership of or entitlement to more than twenty-five percent of shares or capital or profits of the company;
 - b. “Control” shall include the right to appoint majority of the directors or to control the management or policy decisions including by virtue of their shareholding or management rights or shareholders agreements or voting agreements;
 2. In case of a partnership firm, the beneficial owner is the natural person(s) who, whether acting alone or together, or through one or more judicial person, has ownership of entitlement to more that fifteen percent of capital or profit of the partnership;
 3. In case of an unincorporated association or body of individuals, the beneficial owner is the natural person(s), who, whether acting alone or together, or through one or more judicial person, has ownership of or entitlement to more than fifteen percent of the property or capital or profits of such association or body of individuals;
 4. Where no natural person is identified under (1) or (2) or (3) above, the beneficial owner is the relevant natural person who holds the position of senior managing official;
 5. In case of a trust, the identification of beneficial owner(s) shall include identification of the author of the trust, the trustee, the beneficiaries with fifteen percent or more interest in the trust and any other natural person exercising ultimate effective control over the trust through a chain of control or ownership.
- V. An Agent is a person employed to do any act for another, or to represent another in dealing with third person.
- VI. The successful bidder shall not be allowed to sub-contract work to any contractor from a country which shares a land border with India unless such contractor is registered with the Competent Authority.
- VII. Not with standing anything contained herein, the order will not apply to bidders from those countries (even if sharing a land border with India) to which the Government of India has extended lines of credit or in which the Government of India is engaged in development projects. Updated lists of countries to which lines of credit have been extended or in which development projects are undertaken are given in the website of the Ministry of External Affairs.
- VIII. Certificate/Declaration to be provided by all bidders:
 “I have read the clause regarding restriction on procurement from a bidder of a country which shares a land border with India and on sub-contracting to contractors from such countries; I certify that this bidder is not from such a country or, if it is from such a country, has been registered with the Competent Authority and will not sub-contract any work to a contractor from such countries unless such contractor is registered with the Competent Authority. I hereby certify that this bidder fulfils all requirement in this regard and is eligible to be considered. (Where applicable, evidence of valid registration by the Competent Authority shall be attached.)”

35.0 Civil Liability for Nuclear Damages (CLND) Act 2010 & Rule 2011 thereof:

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- 35.1** Subsequent to the enactment of CLND Act 2010 and Rule 2011, the Corporation shall have Right to Recourse against the contractor in accordance with provisions under Section 17(a) of Civil Liability for Nuclear Damage Act, 2010 as mentioned under clause 35.2.

To have clarity on the terms used in the CLND Act 2010 and Rule 2011 pertaining to Right to Recourse, following definition to be considered by the bidder before submission of bids.

- i. "Contractor" – shall be as per applicable GCC.
- ii. "Supplier" shall be as defined in CLND Rule 24(2).
- iii. "Product Liability Period (PLP)" shall be as defined in CLND Rule 24(2).
Explanation w.r.t. GCC: The PLP shall be the Defect Liability Period plus contractual Latent Defect Liability Period (as applicable).
- iv. "Initial License" (Refer CLND Rule 24-2): The initial license, unless otherwise specified, is valid for a period of five years from the date of its issue by AERB.

35.2 Right of recourse under Civil Liability for Nuclear Damages Act 2010 & Rule 2011 thereof

- (a) The Corporation shall have Right to Recourse against the supplier in accordance with provisions under Section 17(a) of Civil Liability for Nuclear Damage Act, 2010, with following limitations, as stipulated in Rule 24 of the Civil Liability for Nuclear Damage Rules, 2011:

The Supplier's liability shall be to the extent of the Operator's liability under sub-section (2) of Section 6 of the Act or the value of the contract, whichever is less,

AND

The duration of Supplier's liability shall be limited to duration of initial license issued by AERB or the product liability period, whichever is longer.

- (b) The term "supplier" and the duration and extent of supplier's liability are explained in Rule 24 of the Civil Liability for Nuclear Damage (CLND) Rules, 2011. For any questions relating to supplier's liability under section 17 of the Civil Liability for Nuclear Damage (CLND) Act, 2010, Government of India's clarifications dated February 08, 2015 may be referred to. These have been posted at the websites of Ministry of External Affairs and the Department of Atomic Energy under the title "Frequently Asked Questions and Answers on Civil Liability for Nuclear Damage Act 2010 and Related Issues".
- (c) In regard to contracts with manufacturers of or vendors for supply of systems, equipment, components, or building of structures, or provision of services to nuclear installations which are operating or are under construction or those to be installed in future for which NPCIL is the system designer and technology owner, being responsible for safety design of such installations, NPCIL shall assume the role of supplier in accordance with the explanation of the term "supplier" given in Rule 24 of the CLND Rules, 2011 and in the context of section 17(a) and (b) of the CLND Act, 2010.
- (d) Other suppliers can avail the Nuclear Suppliers' Special Contingency (Against Right of Recourse) Insurance Policy provided by the India Nuclear Insurance Pool to cover any liability exposure under section 17(a) and (b) of the CLND Act, 2010. NPCIL maintains the operator's statutory insurance under the CLND Act, 2010 by subscribing to the Nuclear Operator's Liability Policy offered by the India Nuclear Insurance pool, thereby subrogating to the India Nuclear Insurance pool the operator's "right of recourse" against suppliers under section 17(a) & (b) of the CLND Act, 2010.

- 35.3** If, the requirement is for PHWR: Since, NPCIL is the system designer and technology owner, being responsible for safety design of such installations in this tender, NPCIL shall assume the role of supplier in accordance with the explanation of the term "supplier" given in Rule 24 of the CLND Rules, 2011 and in the context of section 17(a) and (b) of the CLND Act, 2010.

Kudankulam Nuclear Power Project	Construction of 203 Nos of Residential Quarters comprising of 40 Nos of E-type (G+10 floor-1 Tower), 80 Nos of D-Special quarters (G+10 floor-2 Tower), 80 Nos of B-type quarters (G+10 floor-2 Tower) and 3 Nos of F Type quarters (G+1 floor) at Anuvijay Township.
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35.4 The applicability of this clause shall be as per schedule-A of GCC.

36.0 Information of contract employees

The corporation as a labour welfare measure may collect information of all contract employees deployed for the work in a computerised programme i.e. Contract employee information management system or equivalent. The contractor may be provided access to this software. It shall be binding on the Contractor to submit the desired information at his own cost at the periodicity as decided by NPCIL.

37.0 Limitation of Liability

Except in cases of criminal negligence or wilful misconduct,

- (a)** The Contractor shall not be liable to the Corporation, whether in contract, tort, or otherwise, for any indirect or consequential loss or damage, loss of use, loss of production, or loss of profits or interest costs, provided that this exclusion shall not apply to any obligation of the Contractor to pay liquidated damages and/or any other penalties/recovery etc. specifically provided for in the Contract, to the Corporation.
- (b)** The aggregate liability of the Contractor to the Corporation, whether under the Contract, in tort or otherwise, shall not exceed the total Contract Price, provided that this limitation shall not apply to the cost of repairing or replacing defective equipment, or to any obligation of the Contractor to indemnify the Corporation with respect to IPR infringement.

Station Director (KKNPP-3&4)

For and on and behalf of Corporation

Kudankulam Nuclear Power Project	Construction of 203 Nos of Residential Quarters comprising of 40 Nos of E-type (G+10 floor-1 Tower), 80 Nos of D-Special quarters (G+10 floor-2 Tower), 80 Nos of B-type quarters (G+10 floor-2 Tower) and 3 Nos of F Type quarters (G+1 floor) at Anuvijay Township.
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FORMATS

Number	Description
1	Details to be furnished by bidder
2	Work experience
3	Financial data
4	Certificate giving details of bill wise payment received and their respective TDS amount for works executed for clients other than Government/Government Autonomous bodies/Public Sector Units.
5	Details of black listing (or any other term meaning the same) (During last five financial years)
6	Details of work experience done in foreign country as per Format-6
7	Bid Capacity as per Format-7
8	Additional PQ Criteria (if specified)

Kudankulam Nuclear Power Project	Construction of 203 Nos of Residential Quarters comprising of 40 Nos of E-type (G+10 floor-1 Tower), 80 Nos of D-Special quarters (G+10 floor-2 Tower), 80 Nos of B-type quarters (G+10 floor-2 Tower) and 3 Nos of F Type quarters (G+1 floor) at Anuvijay Township.
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FORMAT-1

DETAILS TO BE FURNISHED BY BIDDER

S. NO.	PARTICULARS	DETAILS		
1	Name of Bidder/ enterprise / company/Legal Entity			
2	Address/Contact No.			
3	a) Place of incorporation b) Year of incorporation			
4	Type of organization	Proprietary firm Company Partnership firm/LLP Co-operative Society/Registered Society/ Registered Trust Limited company Joint venture(unincorporated)/Consortium Joint Venture Company (JVC) PSU/Govt Entity/Autonomous Body Any other Legal Entity		
5	Udyam Registration certificate details			
5.1	Udyam Registration certificate no			
5.2	Date of registration			
5.3	Type of enterprise	Micro/Small/Medium Manufacturing/service		
5.4	Social category of entrepreneur	SC/ST/OBC/Gen		
5.5	Gender of entrepreneur	Men/Women/Other		
5.6	Details of registered services	SN	NIC five digit code	Details of activity
6	Name of DSC Holder			
7	Name of Power of Attorney of holder			
8	PAN (Permanent Account Number)			

Kudankulam Nuclear Power Project	Construction of 203 Nos of Residential Quarters comprising of 40 Nos of E-type (G+10 floor-1 Tower), 80 Nos of D-Special quarters (G+10 floor-2 Tower), 80 Nos of B-type quarters (G+10 floor-2 Tower) and 3 Nos of F Type quarters (G+1 floor) at Anuvijay Township.
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S. NO.	PARTICULARS	DETAILS
9	GST details of Bidder	
9.1	Whether Registered under GST?	Yes/No
9.2	In case Unregistered, mention the reason for not registering. (Please tick). In case of (b) please give full details.	<input type="checkbox"/> a) Not required as per Section 22 (1) of CGST Act. <input type="checkbox"/> b) Any other provision under GST act, please specify--- -----
9.3	If yes, mention the GSTIN ID/ARN (Application Reference Number) /Provisional ID No	
9.4	Address (as per registration with GST with Postal Code)	
9.5	Any change in the status of Registration of the bidder, after award of the Contract shall be disclosed to the Corporation forthwith. Please confirm.	<input type="checkbox"/> We Confirm
9.6	All the benefits and credits on inputs as available under GST acts/rules are availed and passed on the benefits to Corporation in bid price complying with provision of Anti-profiteering measures. Please confirm.	<input type="checkbox"/> I/ We Confirm. <input type="checkbox"/> Not Applicable
9.7	Type of business	
9.8	Whether the GST registration is active	Yes/ No
9.9	Mention whether Reverse Charge Mechanism (RCM) is applicable for the tendered work.	Yes/No
10	Registration no of EPF(Employees' Provident Fund)	
11	Registration no of ESI(Employee State Insurance)	

Kudankulam Nuclear Power Project	Construction of 203 Nos of Residential Quarters comprising of 40 Nos of E-type (G+10 floor-1 Tower), 80 Nos of D-Special quarters (G+10 floor-2 Tower), 80 Nos of B-type quarters (G+10 floor-2 Tower) and 3 Nos of F Type quarters (G+1 floor) at Anuvijay Township.
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S. NO.	PARTICULARS	DETAILS
12	a) Is your near relative(s) working in Corporation	Yes/No
	b) If yes, Name(s) and details of posting in Corporation	
13	Make in India	
13.1	% of Local Content	
13.2	Class of Local Supplier	
14	Startup	Yes/No
14.1	If yes, Startup India Certificate No.	
15	Bidder has conflict of interest as per clause no. 11.2 of Part 1 of NIT.	Yes/No
16	Bidder's email id for any official correspondence by corporation	
17	Bidder's telephone no./ mobile no. for any official correspondence by corporation	
18	Bank Details of Bidder for any Financial Transaction between Corporation and Bidder	
18.1	Bank Name	
18.2	Branch Name	
18.3	Account Number	
18.4	IFSC	
19	GeM Seller ID(if available)	

Kudankulam Nuclear Power Project	Construction of 203 Nos of Residential Quarters comprising of 40 Nos of E-type (G+10 floor-1 Tower), 80 Nos of D-Special quarters (G+10 floor-2 Tower), 80 Nos of B-type quarters (G+10 floor-2 Tower) and 3 Nos of F Type quarters (G+1 floor) at Anuvijay Township.
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FORMAT- 2
WORK EXPERIENCE

1. Name of Work			
2. Agreement no. / Contract no. / Work order No. with bill of quantities and rates details	No		
	Date		
3. Details of Client: a) Name b) Address c) Phone d) e-mail			
4. Whether the client is Government / private entity			
5. Nature of client firm in case client is private entity	Private Proprietary Partnership Private limited Public limited Any other Legal Entity		
6. Date of commencement of work			
7. Stipulated date of completion			
8. Actual date of completion			
9. Value of work done on completion: Value of similar nature work on completion: Value of similar nature of work on completion after escalation as per clause no.1.3.8 of Part 1 or Operating Part of NIT			
10. Ref. no and date of client's completion certificate or similar documentary evidence certifying completeness of work issued by client			
11. If work is done with Government/Government Autonomous Bodies/Public Sector Units, documents as per clause no. 1.3.5.1 of Part 1 or Operating Part of NIT	Uploaded/Not Uploaded /Not Applicable		
12. If work is done with other than Government/Government Autonomous Bodies/Public Sector Units, documents as per clause no. 1.3.5.2 of Part 1 or Operating Part of NIT	Uploaded/Not Uploaded /Not Applicable		
13. Whether the work has been completed satisfactorily Unsatisfactory/poor performance refers to such as abandoning the work, rescission of the contract for reasons which are attributable to non-performance of the contractor, inordinate delays in completion, history of litigation resulting in award against the contractor or any of the constituents, or financial failure due to bankruptcy, and so on.	Yes/No		
14. Whether any banning(or any other term meaning the same) was done against this work	Yes/No		

Kudankulam Nuclear Power Project	Construction of 203 Nos of Residential Quarters comprising of 40 Nos of E-type (G+10 floor-1 Tower), 80 Nos of D-Special quarters (G+10 floor-2 Tower), 80 Nos of B-type quarters (G+10 floor-2 Tower) and 3 Nos of F Type quarters (G+1 floor) at Anuvijay Township.
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15. Similar Value of work (completed) meeting criteria of 80%/50%/40% of estimated cost put to tender.	80%/50%/40% of estimated cost put to tender.
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NOTES: a) Details of only similar works as defined in the pre-qualification criteria shall be uploaded. b) The bidder shall fill the relevant details. If the bidder fills that the details are “as per enclosure/attached annexure”, then such submission will not be considered for evaluation. c) For each work experience separate format has to be filled. d) The cost of completed work shall mean gross value of the completed work including all the taxes and levies, escalation (if any), cost of material supplied by the client on chargeable basis but excluding those supplied free of cost. The cost of chargeable material shall be the fixed value at which the client had supplied the material.	
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Kudankulam Nuclear Power Project	Construction of 203 Nos of Residential Quarters comprising of 40 Nos of E-type (G+10 floor-1 Tower), 80 Nos of D-Special quarters (G+10 floor-2 Tower), 80 Nos of B-type quarters (G+10 floor-2 Tower) and 3 Nos of F Type quarters (G+1 floor) at Anuvijay Township.
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FORMAT-3
FINANCIAL DATA

(On letter head of Chartered Accountant)

This is to certify that the financial data of M/s _____, having PAN no: -----, Regd. Office address: ----- is as under: -

Amount (in INR (₹))

SR. NO.	DESCRIPTION	AUDITED FINANCIAL DATA FOR LAST FIVE FINANCIAL YEARS				
		Year _____	Year _____	Year _____	Year _____	Year _____
1.	Annual turnover				_____	
2.	Average Annual Turnover					_____
3.	Profit Before (PBT) for preceding 5 financial years					
4.	Net worth as per latest audited financial statement as mentioned in Net Worth Certificate	Year _____	_____			

We have obtained all the information from the Bidder which is necessary for the purpose of certification. It is certified that the all information are correct to the best of our knowledge and belief. It is certified that during certification, all supporting documents were examined by us.

(Signature, Seal having membership no./ FRN of CA with UDIN)

Date:

NOTES:

1. The information is to be certified by a practicing Chartered Accountant on his letterhead, under his signature and seal having membership no./FRN and UDIN. Bidder shall fill the data in excel sheet as mentioned in the certificate and then upload the certificate with bid.
2. Separate Format shall be used for each member in case of JV (unincorporated)/ Consortium. All such documents shall reflect the financial data of the bidder or member in case of JV (unincorporated)/Consortium and not that of sister of parent company.
3. Net Worth shall mean aggregate value of the paid-up share capital and all reserves created out of the profits and securities premium account, after deducting the aggregate value of the accumulated losses, deferred expenditure and miscellaneous expenditure not written off, as per the audited balance sheet, but does not include reserves created out of revaluation of assets, write back of depreciation and amalgamation.
4. For the purpose of this certificate Annual Turnover shall mean "Sale Value or Operating Income."
5. In case audited financial data of the immediate preceding financial year is not made available by the bidder, he has to upload a certificate issued by a practicing Chartered Accountant on his letterhead under his signature and seal having membership no./FRN and UDIN stating that "the balance sheet for FYhas actually not been audited so far". In such case the

Kudankulam Nuclear Power Project	Construction of 203 Nos of Residential Quarters comprising of 40 Nos of E-type (G+10 floor-1 Tower), 80 Nos of D-Special quarters (G+10 floor-2 Tower), 80 Nos of B-type quarters (G+10 floor-2 Tower) and 3 Nos of F Type quarters (G+1 floor) at Anuvijay Township.
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financial data of one more preceding audited financial year as applicable shall be submitted by the Bidder for evaluation purpose.

In such case bidder shall provide the financial data of last three/five audited financial years as the case may be, same shall be taken into consideration for evaluation.

6. Net Worth (if required) as per clause no. 2.3 of Part 1 or Operating Part of NIT shall be submitted.
7. Profit before tax criteria shall be applicable for tenders of estimated cost put to tender of ₹ 10 Crores and above.

Kudankulam Nuclear Power Project	Construction of 203 Nos of Residential Quarters comprising of 40 Nos of E-type (G+10 floor-1 Tower), 80 Nos of D-Special quarters (G+10 floor-2 Tower), 80 Nos of B-type quarters (G+10 floor-2 Tower) and 3 Nos of F Type quarters (G+1 floor) at Anuvijay Township.
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FORMAT-4

Certificate giving details of bill wise payment received and their respective TDS amount for works executed for clients other than Government/Government Autonomous bodies/Public Sector Units

(On letter head of Chartered accountant)

Company Name: M/s

Name of work:

Work order / agreement no. :

Work order / agreement date:

Completion Certificate Number/ similar documentary evidence certifying completeness of work issued by client Number:

Client's Name, Address & Contact Details:

PAN no. of client:

PAN no. of bidder:

Sr. No.	Bill No.	Bill Period	Rate of TDS	Bill Amount	TDS Amount
1.					
2.					
3.					
4.					
5.					
	Total				

We have obtained all the information from the bidder which is necessary for the purpose of certification. It is certified that the all information are correct to the best of our knowledge and belief. The certification process involves examining the supporting documents.

(Signature, Seal having membership no./ FRN of CA with UDIN)

Notes:

- 1) The number of rows may be increased to suit the requirement.
- 2) The above format shall be uploaded separately for each work order/agreement
- 3) Bidder shall take out the print of this format and get it filled and certified by Chartered Accountant under his signature and seal having membership no./FRN and UDIN.
- 4) Value of work done will be commensurate with value of respective TDS amount.
- 5) In case of multiple contracts taken from a client, details of respective TDS amount for each work need to be segregated and given separately.

Kudankulam Nuclear Power Project	Construction of 203 Nos of Residential Quarters comprising of 40 Nos of E-type (G+10 floor-1 Tower), 80 Nos of D-Special quarters (G+10 floor-2 Tower), 80 Nos of B-type quarters (G+10 floor-2 Tower) and 3 Nos of F Type quarters (G+1 floor) at Anuvijay Township.
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FORMAT-5

THE DETAILS OF BLACK LISTING / SUSPENSION/DE-REGISTRATION /DEBARRING/ HOLIDAY LISTING OR ANY OTHER TERM MEANING THE SAME IN CENTRAL STATE GOVERNMENT, PSU & PUBLIC BODIES (During last five financial years)

Sr. No.	Name of Client	Work Order/ Agreement No.	Value of work in lakhs	Blacklisting (or any other term meaning the same) period	Reasons	Ref. Letter no. informing of black listing

NOTES:

1. The bidder shall upload the details of black listing /de-registration / holiday/suspension/ any other term meaning the same by any central / state government department or public sector undertaking. The relevant letter shall be scanned and uploaded.

Kudankulam Nuclear Power Project	Construction of 203 Nos of Residential Quarters comprising of 40 Nos of E-type (G+10 floor-1 Tower), 80 Nos of D-Special quarters (G+10 floor-2 Tower), 80 Nos of B-type quarters (G+10 floor-2 Tower) and 3 Nos of F Type quarters (G+1 floor) at Anuvijay Township.
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FORMAT- 6
WORK EXPERIENCE IN FOREIGN COUNTRY

1	Name of Work		
2	Agreement no. / Contract no. / Work order with bill of quantities and rates details	No	
		Date	
3	Name of bidder company as is mentioned in work order		
4	Details of Client: a) Name b) Address c) Phone d) e-mail		
5	Whether the client is Government / private entity		
6	Country where the work was executed		
7	Date of commencement of work		
8	Stipulated date of completion		
9	Actual date of completion		
10	Value of work done on completion in foreign currency: Currency name: Bills selling exchange rates notified by The State Bank of India: Value of work done on completion in Indian rupee: Value of similar work done in completion: Value of similar work done in completion after escalation as per clause: 1.3.8 of Part 1 or Operating Part of NIT:		
11	Ref. no and date of client's completion certificate or similar documentary evidence certifying completeness of work issued by client		
12	Whether documents as per clause 1.3.7 of Part 1 or Operating Part are uploaded	Uploaded/Not Uploaded	
13	Whether the work has been completed satisfactorily. Unsatisfactory/poor performance refers to such as abandoning the work, rescission of the contract for reasons which are attributable to non-performance of the contractor, inordinate delays in completion, history of litigation resulting in award against the contractor or any of the constituents, or financial failure due to bankruptcy, and so on	Yes/No	
14	Whether any banning (or any other term meaning the same) was done against this work.	Yes/No	
15	Similar Value of work completed meeting criteria of 80%/50%/40% of estimated cost put to tender.	80%/50%/40% of estimated cost put to tender.	
	NOTE: a) Details of only similar works as defined in the pre-qualification criteria shall be uploaded. b) The bidder shall fill the relevant details. If the bidder fills that the details are "as per enclosure/attached annexure", then such submission will not be considered for evaluation. c) For each work experience separate format has to be filled. d) The cost of completed work shall mean gross value of the completed work including all the taxes and levies, escalation (if any), cost of material supplied by the client on chargeable basis but excluding those supplied free of cost The cost of chargeable material shall be the fixed value at which the client had supplied the material.		

Kudankulam Nuclear Power Project	Construction of 203 Nos of Residential Quarters comprising of 40 Nos of E-type (G+10 floor-1 Tower), 80 Nos of D-Special quarters (G+10 floor-2 Tower), 80 Nos of B-type quarters (G+10 floor-2 Tower) and 3 Nos of F Type quarters (G+1 floor) at Anuvijay Township.
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FORMAT-7

BID CAPACITY

(Applicable for tenders with estimated cost put to tender equal to or above ₹ 10 Crores)

(On the letterhead of Chartered Accountant)

This is to certify that the Bid Capacity of M/s _____ having PAN No. _____, Regd. Office address: _____ is as under: -

The bid capacity of the contractor shall be determined by the following formula:

Bid Capacity = $(A \times N \times 2) - B$

Where,

'A' = maximum value of works executed in any one year during last five financial years.

'B' = Value of existing commitments and ongoing works calculated from last date of month previous to one in which this NIT has been published, to be completed in the next 'N' years.

'N' = Number of years prescribed for completion of the subject contract.

Ongoing Works also include work under extension.

Particulars	Amount (in INR)
A	
B	
N	
Bid Capacity (A x N x 2)-B	

NOTES:

- Maximum value of works executed ("A") would represent the highest turnover among the last 5 financial years.
- Financial data (i.e., value of works executed in any one year i.e., annual turnover) will be brought to current costing level by enhancing the actual value of work at simple rate of 7% per annum or part thereof calculated from the last date of that financial year. The last date of that financial year shall be excluded for the purpose of calculating escalation and last date of month previous to the commencement date of sale/download of tender shall be included for the purpose of calculating escalation.
- Separate Performa shall be used for each member in case of JV (unincorporated) / Consortium.
- All such documents reflect the Bid capacity of the bidder or member in case of JV (unincorporated) / Consortium, and not that of sister or parent company.
- The Bid capacity in above format shall be certified by practicing Chartered Accountant / Company Auditor on his letterhead, under his signature and seal having membership no./FRN and UDIN. Bidder shall fill the data in excel sheet as mentioned in the certificate and then upload the certificate with bid.

We have obtained all the information from the Bidder which is necessary for the purpose of certification. It is certified that all the information are correct to the best of our knowledge and belief. It is certified that during certification, all supporting documents were examined by us.

(Signature, Seal having membership no./FRN of Chartered Accountant with UDIN)

Kudankulam Nuclear Power Project	Construction of 203 Nos of Residential Quarters comprising of 40 Nos of E-type (G+10 floor-1 Tower), 80 Nos of D-Special quarters (G+10 floor-2 Tower), 80 Nos of B-type quarters (G+10 floor-2 Tower) and 3 Nos of F Type quarters (G+1 floor) at Anuvijay Township.
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FORMAT- 8
ADDITIONAL PQ CRITERIA

(Not Applicable)

APPENDIX

Number	Description
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Kudankulam Nuclear Power Project	Construction of 203 Nos of Residential Quarters comprising of 40 Nos of E-type (G+10 floor-1 Tower), 80 Nos of D-Special quarters (G+10 floor-2 Tower), 80 Nos of B-type quarters (G+10 floor-2 Tower) and 3 Nos of F Type quarters (G+1 floor) at Anuvijay Township.
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1	Joint venture(unincorporated) /Consortium agreement/MOU (Memorandum of Understanding)
2	Integrity pact
3	Power of attorney format
4	Undertaking by bidder
5	Bank solvency format
6	Visitor's details format
7	Format for undertaking by contractor for compliance of labor laws
8	Letter of Intent
9	Certification under preference to Make in India order
10	Self-certification for proprietorship firm
11	Form for Certificate of Net Worth from Chartered Accountant
12	Self Declaration on Proceedings under Insolvency and Bankruptcy Code (IBC)
13	Deviations to Tender Conditions
14	Appendix -14 (QR/Pre Qualification Criteria Document Authentication process)

APPENDIX-1

Joint Venture (JV)/Consortium Agreement/MOU (Memorandum of Understanding)

Kudankulam Nuclear Power Project	Construction of 203 Nos of Residential Quarters comprising of 40 Nos of E-type (G+10 floor-1 Tower), 80 Nos of D-Special quarters (G+10 floor-2 Tower), 80 Nos of B-type quarters (G+10 floor-2 Tower) and 3 Nos of F Type quarters (G+1 floor) at Anuvijay Township.
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(Below mentioned format is a sample format and the JV (unincorporated) /Consortium partners may modify suitably, however the major aspects like share of interest, division of responsibility, joint and several responsibility etc should invariably be covered in the MOU.)

The use of word Joint Venture(s) /JV anywhere in this format refers to “unincorporated Joint Venture(s)/JV”.

The parties hereto declare that they have agreed to form a joint venture/consortium for the purpose of uploading the pre-qualification application/ bid document initially and then tender/bid and if successful for the execution of the works as an integrated joint venture/consortium. The parties are not, under this agreement, entering into any permanent partnership of Joint Venture/consortium to Tender/bid or undertake any contract other than the subject works. Nothing herein contained shall be considered to constitute the parties of partners to constitute either partly or wholly the agent of the other.

1.0 WITNESS:

Whereas Nuclear Power Corporation of India Limited (NPCIL) has invited offers from intending bidders and NPCIL has permitted a group of up to Three firms forming a Joint Venture/Consortium to be eligible to be a bidder and whereas two/three (as the case may be) of the parties of Joint Venture/Consortium are desirous to enter into a Joint Venture/Consortium in the nature of partnership engaged in the joint undertaking for the specific purpose of execution of the work of ----- vide tender no.-----and whereas the parties have reached understanding to upload pre-qualification application / offer, if pre-qualified and to execute the contract if awarded.

This agreement witness as follows:

- 1.1 The parties do not enter into an agreement of any permanent partnership of Joint Venture/Consortium to tender/bid or undertake any contract other than the specified above.
- 1.2 The operation of this joint venture/Consortium, concerns is confined to the work of -----
- vide tender no. -----.
- 1.3 The name of the Joint Venture/Consortium for convenience and continuity shall be -----

- 1.4 The address of the Joint Venture/Consortium for communication shall be as under-----

- 1.5 The Joint Venture/Consortium shall jointly upload qualification criteria on the above name according to all terms and conditions stated in the relevant instructions contained in the bid documents.
- 1.6 That this Joint Venture/Consortium shall regulate the relations between the parties thereto and shall include without being limited to them the following conditions:
 - a. ----- firm shall be the lead partner/member in charge of the Joint Venture/Consortium for all intents and purpose and who shall have authority to bind each of the JV/Consortium partner(s).

The Lead partner/member of the consortium shall be responsible towards:

- (a) preparation and submission of bid on behalf of the JV/Consortium,
- (b) to negotiate with the Corporation (if selected by the Corporation for negotiation)
- (c) acceptance of the contract on behalf of JV/Consortium,

Kudankulam Nuclear Power Project	Construction of 203 Nos of Residential Quarters comprising of 40 Nos of E-type (G+10 floor-1 Tower), 80 Nos of D-Special quarters (G+10 floor-2 Tower), 80 Nos of B-type quarters (G+10 floor-2 Tower) and 3 Nos of F Type quarters (G+1 floor) at Anuvijay Township.
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- (d) correspondence with the parties, co-ordination between the Corporation, JV/Consortium Partners and other agencies concerned,
 - (e) submission of the Contract Securities and other documents,
 - (f) to submit invoice and other documents and receive the payment,
 - (g) to ensure performance of the contract.
 - (h) to respond promptly in settlement of disputes arising during any stage from submission of bid till closure of contract
 - (i) to participate in the process of arbitration.
- b. In case the said work is awarded to the Joint Venture/Consortium the partners of the Joint Venture/Consortium will nominate a person with duly notarized Power of Attorney on stamp paper, who will represent the Joint Venture/Consortium with the authority to incur liabilities, receive instructions and payments, sign and execute the contract for and on behalf of the Joint Venture/Consortium.
- 1.7** The parties agree to make financial participation and to place at disposal of Joint Venture/Consortium the benefits of its individual, technical knowledge, skill and shall in all respect bear its share as regards planning and execution of the work and responsibilities including provision of information, advice and other assistance required in the Joint Venture/Consortium and participation shall be in proportion of
- Firm A-----%
- Firm B-----%
- Firm C-----%
- Total 100%
- 1.8** All rights, interests, liabilities, obligations work experience and risks (and all net profit or net losses) arising out of the contract shall be borne by the parties in proportion to their share. Each of the parties shall furnish its proportionate share in any bonds, guarantees; sureties required for the works as well its proportionate share in connection with the works. The share and participation of the partners in working capital and other financial requirements shall be in ratios mentioned above.
- 1.9** The Joint Venture/Consortium authorizes Sh. ----- Designation ----- to upload the bid offer, clarification, enter into negotiation and for any action required in respect of matters arising under the contract with NPCIL.
- 2.0** **Duration of the Joint Venture/Consortium Agreement:** It shall be valid during the entire currency of the contract including the period of extension if any and the defect liability period after the work is completed.
- 3.0** **Governing Laws:** The Joint Venture/Consortium Agreement shall in all respect be governed by and interpreted in accordance with Indian Laws.
- 4.0** **Internal responsibilities and liabilities:**
- (a) The division of individual scope of work may be worked out mutually by the parties but the party shall be jointly and severally liable to the NPCIL for the execution of the contract commitment in respect of the works in accordance with contract conditions.
- The responsibilities for performing execution of the said contract by each JV/Consortium partner is as indicated in the Annexure-I. It is further agreed by the

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JV/Consortium partners that the above sharing of responsibilities and obligations shall not in any way be a limitation of joint and several responsibilities of the members under this agreement.

- (b) The parties specifically undertake to carry out their separate and full compliance with the contract with the NPCIL. Each party shall be responsible jointly and severally for consequences if any arising out of defective or delayed execution of works which falls within the individual party's area or responsibility and / or it has been caused due to acts and or omission of the concerned party.
- (c) The parties jointly & severally agree to replace, modify or repair any defect in their respective portion of works in accordance with the terms and condition of the contract with the NPCIL.
- (d) The parties jointly and severally indemnify and hold harmless to each other against any claim made by the NPCIL or any other third party for injury, damage loss or expenses is attributed to the breach/ non performance of his responsibilities by the indemnifying party in accordance with the agreements and / or contract with the NPCIL.
- (e) None of parties have joined in any other Joint Venture/Consortium for the said works.

5.0 Responsibilities and liabilities of Joint Venture/Consortium towards the NPCIL:

- (a) Parties hereto shall be jointly & severally liable & responsible for acts, deeds, and things done or omitted (to be done) in respect of the execution of the contract & for any financial liabilities arising there from.
- (b) Parties hereto shall be jointly & severally liable & responsible to the NPCIL for the execution of works in accordance with the contract conditions.
- (c) Parties hereto shall be jointly & severally indemnify NPCIL harmless against any claim made by the NPCIL or any other third party for any injury, damage or loss which may be attributed to the breach of the obligation under the contract, pursuant to the contract.
- (d) The members of the JV/Consortium to which the contract is awarded, shall be jointly and severally liable to the NPCIL for execution of the project in accordance with General, Special Conditions of the contract and as per tender document. The JV/Consortium members shall also be liable jointly and severally for the loss, damages caused to NPCIL during the course of execution of the contract or due to non-execution of the contract or part thereof.
- (e) In case of breach of the said contract by any of the partners of the JV/Consortium, the other JV/consortium partner(s) hereby agree to be fully responsible for the successful execution/performance of the Contract in accordance with the terms and conditions of the contract.

6.0 Termination of the Agreement

The agreement shall be terminated as per the tender conditions and in case of following circumstances:

- (a) On completion of the defect liability period as stipulated in the agreement of the works and all the liabilities thereof are liquidated. The permission of NPCIL shall be obtained before liquidation.
- (b) No partner has the right to assign any benefits, obligation or liability under agreement to any third party without the written consent of the other partners as well as NPCIL.

7.0 Financial Matter

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- (a) Bank Account in the name of the JV/Consortium will be opened with any schedule or nationalized bank to be operated by an individual signatory as decided mutually by the Joint Venture/Consortium Partners.
- (b) All the partners shall be responsible to maintain or cause to maintain proper Books of Accounts in respect of the JV/Consortium as per the Indian Contract Regulation Act and shall be closed at the end of the every financial year ending 31 March. Upon closure of the books of accounts balance sheet and profit and loss account as to the state of affairs of the firm as at the end of the financial year and as to the profit and loss made or incurred by the firm for the year ended on that date shall be prepared for the same, shall subject to audit by a chartered accountant.
- (c) None of the party shall be entitled to make any borrowing on behalf of the JV/Consortium without prior written consent of all the other parties of JV/Consortium.
- (d) On award of the contract to JV/Consortium, PAN and GSTIN shall be obtained in the name of JV/Consortium.

8.0 Legal Jurisdiction

All questions relating to validity interpretation of this agreement shall be governed by the law of India and shall be subject to jurisdiction of Court as per the relevant clause of General Conditions of Contract.

9.0 Settlement of Disputes,

In case of conflict between Work Order issued by the Corporation and JV/Consortium Agreement, Work Order shall take precedence over the JV/Consortium Agreement.

Any dispute in interpretation of any condition mentioned herein shall be referred to an arbitrator/ tribunal by mutual consent of the partners and such proceedings shall be governed by the Indian Arbitration and Conciliation Act. 1996 and as amended from time to time. The award of arbitrator shall be final and binding on the party hereto. Neither the obligation of each party here to the performance of contract nor the execution of work shall stop during the course of arbitration proceeding or as a result thereof.

10.0 Insurance:

The Joint Venture/Consortium shall take such insurance in connection with the work in accordance with the tender condition acceptable to the NPCIL.

11.0 No change shall be made in this agreement without prior written consent of the NPCIL and other parties.

This JV/Consortium agreement remains unaffected due to any change in the in the Article of Association of any one or any number of consortium partners with immediate or retrospective effect.

12.0 Default and withdrawal from the JV/Consortium:

In case that either party fails to observe the provision stipulated in this Agreement withdrawal from the Joint Venture/Consortium, loss and / or expenses incurred by other parties due to such default and /or withdrawal shall be fully compensated by the party who has defaulted.

13.0 All matter relating to or arising due to this agreement shall be treated as confidential and shall not be disclosed to any other party.

In witness whereof the parties have caused their duly authorized representative to sign below:

Witness

1. _____ (Signed for and on behalf of firm A)

2. _____

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Date:

Seal:

Witness

1. _____ (Signed for and on behalf of firm B)

2. _____

Date:

Seal:

Witness

1. _____ (Signed for and on behalf of firm C)

2. _____

Date:

Seal:

ANNEXURE-1 TO JV/CONSORTIUM AGREEMENT

Section - I	Notice Inviting Tender	Page 67 of 101
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(Model DIVISION OF WORK AMONG JV/CONSORTIUM PARTNERS BASED ON THEIR RESPONSIBILITIES AND WORKING ARRANGEMENT)

Sr. No.	Description of work to be carried out by JV/ Consortium (Indicative)	Division of Responsibilities		
		Partner A (Lead Partner)	Partner B	Partner C
1	Coordination of the Tender/Contract			
2	Design & Engineering (if applicable)			
3	Manufacture & Supply of item (if applicable) 1. 2. 3. 4.			
4	Erection & Commissioning (if applicable) 1. 2. 3. 4.			
5	Any other additional responsibilities			

APPENDIX-2

Kudankulam Nuclear Power Project	Construction of 203 Nos of Residential Quarters comprising of 40 Nos of E-type (G+10 floor-1 Tower), 80 Nos of D-Special quarters (G+10 floor-2 Tower), 80 Nos of B-type quarters (G+10 floor-2 Tower) and 3 Nos of F Type quarters (G+1 floor) at Anuvijay Township.
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Format of Pre Contract Integrity Pact

(The submission of bid shall constitute a binding integrity pact as per below mentioned format between the bidder and Authority calling the tender on behalf of Principal/Purchaser/Corporation/Owner/Buyer/NPCIL)

INTEGRITY PACT

Between

Nuclear Power Corporation of India Limited (NPCIL), a company duly incorporated and validly existing under the provisions of Companies Act, 1956 and having its registered office at World Trade Centre, 16th Floor, Cuffe Parade, Colaba, Mumbai 400005, hereinafter referred to as **“The Principal/Purchaser/Corporation/Owner/Buyer/NPCIL”** (which expression shall unless repugnant to the meaning or context hereof include its successors and permitted assigns).

and

“The Bidder/Contractor” (which expression shall unless repugnant to the meaning or context hereof include its successors and permitted assigns).

Preamble

The Principal/Purchaser intends to award, under laid down organizational procedures contract/purchase order/work order for this tender. The Principal/Purchaser values full compliance with all relevant laws of the land, rules, regulations, economic use of resources and of fairness / transparency in its relation with its Bidder(s) and / or Contractor(s).

Integrity Pact (IP) essentially envisages an agreement between the prospective Bidder/Contractor and NPCIL committing the persons/officials of both the parties, not to exercise any corrupt influence on any aspect of the contract.

This pact aims to avoid all forms of corruption by following a system that is fair, transparent and free from any influence/prejudiced dealings prior to, during and subsequent to the currency of the contract to be entered into with a view to enable the Purchaser/Principal to obtain the desired said stores/equipment/services/work (as the case may be) at a competitive price in conformity with the defined specifications by avoiding the high cost and the distortionary impact of corruption on public procurement and also to enable Contractor(s)/Bidder(s) to abstain from bribing or indulging in any corrupt practice in order to secure the contract by providing assurance to them that their competitors will also abstain from bribing and other corrupt practices and the Purchaser/Principal will commit to prevent corruption, in any form, by its officials by following transparent procedures.

In order to achieve these goals, the Purchaser/Principal has appointed Independent External Monitors (IEM), to monitor the Tendering process and the execution of the Contract for compliance with the principles as laid down in this Pact.

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Therefore, to meet the purpose aforesaid both the parties have agreed to enter into this Integrity Pact, the terms and conditions of which shall also be read as integral part and parcel of the Tender documents and Contract between the parties.

Hence, in consideration mutual covenants contained in this Pact, the parties hereby agree as follows and this Pact witnesses as under:

Article 1: Commitment of the Principal/Purchaser

- 1) The Principal/Purchaser commits itself to take all measures necessary to prevent corruption and to observe the following principles;
 - a) The Principal/Purchaser undertakes that no official of the Principal/Purchaser, connected directly or indirectly with the contract, will demand, take a promise for or accept, directly or through intermediaries, any bribe, consideration, gift, reward, favour or any material or immaterial benefit or any other advantage(which he/she is not legally entitled to) from the Bidder/Contractor, either for themselves or for any person, organization or third party related to the contract in exchange for an advantage in the bidding process, bid evaluation, contracting or implementation process related to the Contract.
 - b) The Principal/Purchaser will, during the Tender process, treat all Bidder(s)/Contractor(s) with equity and reason. The Principal/Purchaser will, in particular, before and during the Tender process, provide to all Bidder(s)/Contractor(s) the same information and will not provide to any Bidder(s)/Contractor(s) confidential /additional information through which the Bidder(s)/Contractor(s) could obtain an advantage in relation to the Tender process or the Contract execution.
 - c) The Principal/Purchaser will endeavour to exclude from the Tender process any person, whose conduct in the past has been of biased nature.
 - d) All the officials of the Principal/Purchaser will report to the appropriate office any attempted or committed breaches of the above mentioned commitments as well as any substantial suspicion of such a breach.
- 2) In case of any such preceding misconduct on the part of such official(s) is reported by the Bidder(s)/Contractor(s) to the Principal/Purchaser with full and verifiable facts and the same is prima facie found to be correct by the Principal/Purchaser, necessary disciplinary proceedings, or any other action as deemed fit, including criminal proceedings may be initiated by the Principal/Purchaser and such a person shall be debarred from further dealings related to the contract process. In such a case while an enquiry is being conducted by the Principal/Purchaser the proceedings under the contract would not be stalled.

Article 2-Commitments of the Bidder(s)/Contractor(s)

- 1) It is required that each Bidder/Contractor (including their respective officers, employees and agents) adhere to the highest ethical standards, and report to the Principal/Purchaser all suspected acts of fraud or corruption or Coercion or Collusion of which it has knowledge or becomes aware, during the tendering process, throughout the negotiation or award of a contract and during the execution of contract.

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- 2)** The Bidder(s)/Contractor(s) commit and undertake themselves to take all measures necessary to prevent malpractices & corruption. The Bidder(s)/ Contractor(s) commit themselves to observe the following principles during his participation in the Tender process and during the Contract execution;
- a)** The Bidder(s)/Contractor(s) will not, directly or through any other person or firm, offer, promise or give or attempt, to any of the Principal's/Purchaser's employees involved in the Tender process or execution of the Contract or to any third person on their behalf any material or other benefit which he/she is not legally entitled to, in order to obtain, in exchange, any advantage of any kind whatsoever during the Tender process or during the execution of the Contract.
 - b)** The Bidder(s)/Contractor(s) further undertakes that it has not given, offered or promised to give, directly or indirectly any bribe, gift, consideration, reward, favour, any material or immaterial benefit or other advantage, commission, fees, brokerage or inducement to any official of the Principal/Purchaser or otherwise in procuring the Contract or forbearing to do or having done any act in relation to the obtaining or execution of the contract or any other contract with the PSU/Government for showing or forbearing to show favour or disfavour to any person in relation to the contract or any other contract with the PSU/Government.
 - c)** The Bidder(s)/Contractor(s) will not enter into with other Bidder(s)/Contractor(s) any undisclosed agreement or understanding, whether formal or informal. This applies in particular to prices, specifications, certifications, sub-contracts, subsidiary contracts, submission or non-submission of bids or any other actions to restrict competitiveness or to cartelize in the bidding process.
 - d)** The Bidder(s)/Contractor(s) will not commit any offence under the relevant IPC/PC Act or the relevant Anti-corruption Laws of India. Further the Bidder(s)/Contractor(s) will not use improperly, (for the purpose of competition or personal gain), or pass on to others, any information or document provided by the Corporation/Purchaser as part of the business relationship, regarding plans, technical proposals and business details, including information contained or transmitted electronically.
 - e)** The Bidder(s)/Contractor(s) of foreign origin shall disclose the names and addresses of agents/Representatives in India, if any. Similarly, Bidder(s)/Contractor(s) of Indian Nationality shall disclose names and addresses of foreign agents/representatives/principals/associates, if any. Either the Indian agent on behalf of the foreign principal or the foreign principal, directly could bid in a tender but not both. Further, in cases where an agent participates in a tender on behalf of one manufacturer, he would not be allowed to quote on behalf of another manufacturer along with the first manufacturer in a subsequent and/or parallel tender for the same item.
 - f)** The Bidder(s)/Contractor(s) will, when presenting his bid, disclose, with each tender any and all payments he has made, is committed to or intends to make to agents, brokers or any other intermediaries in connection with the award of the Contract.

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- g)** The Bidder(s)/Contractor(s) further confirms and declares to the Principal/Purchaser that the Bidder(s)/Contractor(s) is the original manufacturer/Integrator/authorized government sponsored export entity(if applicable) of the stores and has not engaged any individual or firm or company, whether Indian or foreign, to intercede, facilitate or in any way, to recommend to the Principal/Purchaser or any of its functionaries, whether officially or unofficially, for the award of the contract to the Bidder/Contractor, nor has any amount been paid, promised or intended to be paid to any such individual, firm or company in respect of any such intercession, facilitation or recommendation.
- h)** If the Bidder/Contractor or any employee of the Bidder/Contractor or any person acting on behalf of the Bidder/Contractor, either directly or indirectly, is a relative of any of the officers of the Principal/Purchaser, or alternatively, if any relative of an officer of the Principal/Purchaser has financial interest/stake in the Bidder(s)/Contractor(s) firm, the same shall be disclosed by the Bidder/Contractor at the time of filing or tender.
- The term 'relative' for this purpose would be as defined in Section 2(77) of the Companies Act 2013.
- i)** The Bidder(s)/Contractor(s) shall not lend to or borrow any money from or enter into any monetary dealings or transactions, directly or indirectly, with any employee of the Principal/Purchaser.
- 3)** The Bidder(s)/Contractor(s) will not instigate third persons/parties to commit offences outlined above or be an accessory to such offences.
- 4)** The Bidder(s)/Contractor(s) will not, directly or through any other person or firm indulge in fraudulent practice, wilful misrepresentation or omission of facts or submission of fake/forged documents in order to induce public official/official of NPCIL to act in reliance thereof, with the purpose of obtaining unjust advantage by or causing damage to justified interest of others and/or to influence the procurement process to the detriment of NPCIL interests.
- 5)** The Bidder(s)/Contractor(s) will not, directly or through any other person or firm use coercive practices (which shall include the act of obtaining something, compelling an action or influencing a decision through intimidation, threat or the use of force directly or indirectly, where potential or actual injury may befall upon a person, his/ her reputation or property) to influence their participation in the tendering process.

Article 3 -Integrity Pact Security

- 1)** The EMD/Bid Security submitted for the tender shall also be considered as IP Security. No separate submission of Integrity Pact Security is required at the time of submission of bid. The EMD/Bid Security shall be forfeited for any violation of IP.
- 2)** In case of successful bidder to whom the Contract is awarded, after the release of the EMD, the SD(Security Deposit)/PBG(Performance Bond Bank Guarantee)/PSB (Performance Security Bond)/SD (i.e., Performance Guarantee plus available Retention Money)/Performance Security, as applicable, will serve the purpose of Integrity Pact Security seamlessly during execution of Contract and till the completion of the defect liability period (if

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applicable), or 12 months from the date of the last payment/final bill payment, whichever is later. In such case, for any violation/breach of the Integrity Pact by the Contractor, the SD/PBG/PSB/ SD (i.e., Performance Guarantee plus available Retention Money)/Performance Security, as applicable, shall be forfeited.

Contractor shall initially submit SD/PBG/Performance Guarantee/Performance Security, as applicable as per relevant clauses of Contract to start with. However, Contractor will also be required to extend the validity of SD/PBG/Performance Guarantee/Performance Security, as applicable, till validity of the IP if required.

The Performance Guarantee and Retention Money (if applicable) will be released after completion of the defect liability period (if applicable), or 12 months from the date of the last payment/final bill payment, whichever is later.

- 3) The EMD/Bid Security submitted by the bidders who does not qualify for the tender and qualified unsuccessful bidders shall be returned to the respective bidders as per conditions stipulated under the clause "EMD/Bid Security".

Article 4 - Consequences of Breach

- 1) Without prejudice to any rights that may be available to the Principal/Purchaser under law or the contract or its established policies and laid down procedures, the Principal/Purchaser shall have the following rights in case of breach of this Integrity Pact by the Bidder(s)/Contractor(s) or any one employed by it or acting on its behalf, whether with or without the knowledge of the Bidder(s)/Contractor(s), and the Bidder/ Contractor with its free consent and without any influence accepts and undertakes to respect and uphold the Principal/Purchaser absolute right:

A) Disqualification from tender/bidding process and exclusion from future contracts

If the Bidder(s)/Contractor(s), either before award or during execution of Contract has committed a transgression through a violation of Article 2 above or in any other form, such as to put his reliability or credibility in question, the Principal/Purchaser after giving 14 days notice to the bidder/contractor shall have powers to disqualify the Bidder(s)/Contractor(s) from the Tender process or terminate/cancel/determine the Contract, if already executed or exclude the Bidder/Contractor from future contract award processes as per the procedure mentioned in the "Banning of business dealings by NPCIL/Corporation" or as per the procedure applicable in case of GeM Bid, , as the case may be. The imposition and duration of the exclusion will be determined by the severity of transgression and determined by the Principal/Purchaser as per the procedure mentioned in the "Banning of business dealings by NPCIL/Corporation" or as per the procedure mentioned in "Incident Management Policy" (in case of GeM Bid), as the case may be.

B) Compensation for Damages:

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1) If the Principal/Purchaser has disqualified the Contractor(s)/Bidders(s) from the tender process prior to the award according to Section 3 A), the Principal/Purchaser is entitled to demand and recover the damages equivalent to EMD/Bid Security.

2) If the Principal/Purchaser has terminated the contract according to Section 3 A), or if the Principal/Purchaser is entitled to terminate the contract according to section 3A), the Principal/Purchaser shall be entitled to demand and recover from the Bidder(s)/Contractor(s) the amount equivalent to Security Deposit (SD)/Performance Bond/Performance Security Bond (PSB)/Performance Security, as applicable.

C) Criminal Liability:

If the Principal/Purchaser obtains knowledge of conduct of a Bidder or Contractor, or of an employee or a representative or an associate of a Bidder or Contractor which constitutes corruption within the meaning of PC (Prevention of Corruption) Act, 1988 or if the Principal/Purchaser has substantive suspicion in this regard, the Principal/Purchaser will inform the same to law enforcing agencies/Chief Vigilance Officer for further investigation.

D) In addition to A), B) & C) above, the Principal/Purchaser shall be entitled to take recourse to the relevant provisions of the contract related to Termination/Cancellation/Determination of Contract.

- 2) A transgression is considered to have occurred if the Principal/Purchaser after due consideration of the available evidence concludes that no reasonable doubt is possible.
- 3) Subject to full satisfaction of the Principal/Purchaser, the exclusion of Bidder(s)/ Contractor(s) could be revoked by the Principal/Purchaser if the Bidders(s)/Contractor(s) can prove that he has restored/ recouped the damage caused by him and has installed a suitable corruption prevention system in his organization.
- 4) The decision of the Principal/Purchaser to the effect that a breach of the provisions of this pact has been committed by the Bidder/Contractor shall be final and conclusive on the Bidder/Contractor. However, the Bidder/Contractor can approach the Independent Monitor(s) appointed for the purposes of this Pact.

Article 5- Previous Transgression

- 1) The Bidder(s)/Contractor(s) declares that no previous transgressions impinging on the anti-corruption principle / any malpractice as mentioned in Article-2, has occurred in the last three years from the date of submission of bid with any other Company in any country or with any public or government organisations or Public Sector Enterprises in India that could justify his exclusion from the tender process.

The date of such transgression impinging on the anti-corruption principle in this regard, would be the date on which cognizance of the said transgression was taken by the competent authority.

The transgression(s), for which cognizance was taken even before the said period of three years, but are pending conclusion are also included in above mentioned declaration.

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- 2) If the Bidder(s)/Contractor(s) makes incorrect statement on this subject, he can be disqualified from the Tender process or the contract, if already awarded, can be terminated on this ground or action can be taken as per the procedure mentioned in the “Banning of business dealings by NPCIL/Corporation” or as per the procedure applicable in case of GeM Bid, as the case may be, as deemed fit by the Principal/Purchaser.

Article 6- Equal treatment of all Bidders/Contractors/ Subcontractors

- 1) The Bidder(s)/Contractor(s) undertake(s) to demand from all subcontractors a commitment in conformity with this Integrity Pact. The Bidder(s)/Contractor(s) shall be responsible for any violation(s) of the principles laid down in this agreement by any of its Subcontractors/sub-vendors.
- 2) The Principal/Purchaser will enter into agreements with identical conditions as this one with all Bidders and Contractors.
- 3) The bidder will stand disqualified from the bidding process and the bid of the bidder would be summarily rejected in case of non-acceptance of Integrity Pact.

Article 7 -Company Code of Conduct

Contractor(s)/Bidder(s) are also advised to have a company code of conduct (clearly rejecting the use of bribes and other unethical behaviour) and a compliance program for the implementation of the code of conduct throughout the company/firm/legal entity(as applicable).

Article 8- Independent External Monitor (IEM)

- 1) The Principal/Purchaser has appointed competent and credible Independent External Monitor(s) (IEM) for this Pact in consultation with the Central Vigilance Commission (their names & contact details of the IEM are given in the tender document).
- 2) The task of the IEM shall be to review independently and objectively, whether and to what extent the parties comply with the obligations under this Pact.
- 3) The IEM is not subject to instructions by the representatives of the parties and performs his/her functions neutrally and independently. The IEM would have access to all Contract documents, whenever required. IEM shall convey his observations to the Chairman & Managing Director, Nuclear Power Corporation of India Limited.
- 4) The Bidder(s)/Contractor(s) accepts that the IEM has the right to access, without restriction, to all Project documentation of the Principal/Purchaser including that provided by the Bidder(s)/Contractor(s). The Bidder(s)/Contractor(s) will grant the IEM, unrestricted and unconditional access to his or any of his Sub-Contractor's project documentation. The IEM is under contractual obligation to treat the information and documents of the Contractor(s)/Subcontractor(s) with confidentiality.

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- 5) The IEM has also signed declarations on “Non-Disclosure of Confidential Information” and of “Absence of Conflict of Interest”. In case of any conflict of interest arising at a later date, the IEM shall inform CMD, NPCIL and recuse himself/ herself from that case
- 6) The Principal/Purchaser will provide to IEM sufficient information about all the meetings among the parties related to the Project provided such meetings could have an impact on the contractual relations between the Principal/Purchaser and the Contractor and shall keep the IEM apprised of all the developments in the tender process. The parties offer to the IEMs the option to participate in such meetings.
- 7) As soon as the IEM notices, or has reason to believe, a violation of this Pact, he/she will so inform the Authority designated by the Principal/ Purchaser.
- 8) If the written observations submitted by the IEM discloses a substantiated suspicion of an offence under the relevant IPC/PC Act, and that no visible action is initiated by the NPCIL, within reasonable time, then the IEM shall be at his liberty to take up the issue with Chief Vigilance Officer (CVO)/ Central Vigilance Commissioner (CVC).
- 9) The word “IEM” would include both singular and plural.

Article 9- Facilitation of Investigation

In case of any allegation of violation of any provisions of this Pact or payment of commission, the Principal/Purchaser or its agencies shall be entitled to examine all the documents including the Books of Accounts of the Bidder(s)/Contractor(s) and the Bidder(s)/Contractor(s) shall provide necessary information and documents in English and shall extend all possible help for the purpose of such examination.

Article 10- Duration of the Pact

The IP would be effective from the stage of invitation of bids till the complete execution of the contract. This pact begins with the submission of Bid by Bidder. The validity of this Integrity Pact shall be from the date of the submission of Bid and it shall remain valid during the entire currency of the contract including the period of extension if any and the defect liability period/warranty period after the work is completed to the satisfaction of both the Principal/Owner and the Bidder/Contractor or 12 months from the date of the last payment/final bill payment, whichever is later.

In case the Bidder(s)/Contractor(s) is unsuccessful, this Integrity Pact shall expire after six months from the date of signing of the contract with successful Bidder.

If any claim is made/lodged during the time, the same shall be binding and continue to be valid despite the lapse of this Pact as specified above, unless it is discharged/determined by Chairman & Managing Director, NPCIL.

Article 11-Other Provisions

- 1) This Pact is subject to Indian Law. The place of performance and jurisdiction is the Head Office of the Principal/Purchaser, i.e. Mumbai, India.

Kudankulam Nuclear Power Project	Construction of 203 Nos of Residential Quarters comprising of 40 Nos of E-type (G+10 floor-1 Tower), 80 Nos of D-Special quarters (G+10 floor-2 Tower), 80 Nos of B-type quarters (G+10 floor-2 Tower) and 3 Nos of F Type quarters (G+1 floor) at Anuvijay Township.
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- 2) Changes and supplements, if any shall be signed and executed by both the parties to this pact.
- 3) If the Bidder(s)/Contractor(s) is a Joint venture (unincorporated), partnership or a consortium, submission of bid by authority authorized to submit bid on behalf of Joint venture (unincorporated), partnership or a consortium shall constitute a binding integrity pact as per this format between the bidder and Authority calling the tender on behalf of Corporation/Principal/Purchaser/Buyer/NPCIL.
- 4) Should one or several provisions of this Pact turn out to be invalid, the remainder of this Pact remains valid. In this case, the parties will strive to come to an agreement to their original intentions.
- 5) Any dispute or difference arising between the parties, with regard to the terms of this Agreement/Pact, any action taken by the Principal/Purchaser in accordance with this Agreement/ Pact or interpretation thereof shall not be subject to arbitration.
- 6) Submission of tender/bid by authority authorized to bid on behalf of Bidder(s)/Contractor(s) shall enforce this pact.

Article 12- LEGAL AND PRIOR RIGHTS

- 1) All rights and remedies of the parties hereto shall be in addition to all the other legal rights and remedies belonging to such parties under the Contract and/or law and the same shall be deemed to be cumulative and not alternative to such legal rights and remedies aforesaid.
- 2) Both the Parties agree that this Pact will have precedence over the Tender/Contract documents with regard to any of the provisions covered under this Pact.
- 3) Bidder(s)/Contractor(s) by submission of bid accepts that he/she shall not approach the Courts while the matter/complaint/dispute has been referred to the IEM in terms of this pact and he/she will wait for their decision in the matter before approaching any Court.

Kudankulam Nuclear Power Project	Construction of 203 Nos of Residential Quarters comprising of 40 Nos of E-type (G+10 floor-1 Tower), 80 Nos of D-Special quarters (G+10 floor-2 Tower), 80 Nos of B-type quarters (G+10 floor-2 Tower) and 3 Nos of F Type quarters (G+1 floor) at Anuvijay Township.
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APPENDIX-3

FORMAT FOR POWER OF ATTORNEY TO AUTHORISED SIGNATORY

(Below mentioned format is a sample and indicative format and can be suitably modified to capture relevant details)

(To be executed on non-judicial stamp paper of the appropriate value in accordance with relevant Stamp Act. The stamp paper to be in the name of the firm/company who is issuing the Power of Attorney).

We, M/s _____ (name of the firm/company with address of the registered office) hereby constitute, appoint and authorize Mr. / Ms. _____ (Name and residential address) who is presently employed with us holding the position of _____ and whose signature is given below as our Attorney to do in our name and our behalf all or any of the acts, deeds of things necessary or incidental to our bid for the work _____ (name of work , Tender no.), including signing and submission of bid, participation in the meetings, responding to queries, submission of information/ documents and generally to represent us in all the dealings with NPCIL or any other, In connection with the works until culmination of the process of bidding , till the Contract Agreement is entered into with NPCIL.

We hereby agree to ratify all acts, deeds and things lawfully done by our said Attorney pursuant to this Power of Attorney and that all acts, deeds and things done by our aforesaid Attorney shall always be deemed to have been done by us.

(Add in the case of a Consortium/ Joint Venture)

Our firm is a Member/ Lead Member of the Consortium of _____, _____ and _____.

Dated this the _____ day of _____ 20_____.

(Signature and Name of authorized signatory being given Power of Attorney).

(Signature and Name in block letters of *All the partners of the firm, *Authorized Signatory for the Company)

(*Strike out whichever is not applicable)

Seal of firm/Company

Witness 1:

Witness 2:

Name:

Name:

Address:

Address:

Occupation:

Occupation:

Kudankulam Nuclear Power Project	Construction of 203 Nos of Residential Quarters comprising of 40 Nos of E-type (G+10 floor-1 Tower), 80 Nos of D-Special quarters (G+10 floor-2 Tower), 80 Nos of B-type quarters (G+10 floor-2 Tower) and 3 Nos of F Type quarters (G+1 floor) at Anuvijay Township.
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APPENDIX-4

Undertaking by the bidder

1. I/We have read and examined the notice inviting tender, schedule-A, B, C, Specifications applicable, Drawings & Designs, General Rules and Directions, Conditions of Contract, clauses of contract, integrity pact, Special conditions, Schedule of Rate & other documents and Rules referred to in the conditions of contract and all other contents in the tender document for the work. I accept all the conditions.
2. We have neither concealed any information/document which may result in our disqualification nor made any misleading or false representation in the forms, statements and attachments in proof of the qualification requirements.
3. I/We undertake that I/We have not been blacklisted / de-registered / holiday listed/debarred/ banned for business dealing /any other term meaning the same by NPCIL or any other Competent Authority restricting the bidder from participating in tenders of Govt or CPSEs and applicable to NPCIL as on date of submission of the bids.
4. I/We undertake that the Work Order submitted for evaluation of work experience has not resulted in banning/any other term meaning the same.
5. I/We undertake and confirm that in case of any default of bid conditions Corporation shall without prejudice to any other right or remedy, be at liberty to forfeit the said bid security absolutely.
6. If I/We, fail to furnish the prescribed performance guarantee within prescribed period. I/We agree that the said Corporation shall without prejudice to any other right or remedy, be at liberty to forfeit the said bid security absolutely. Further, if I/We fail to commence work as specified, I/We agree that Corporation shall without prejudice to any other right or remedy available in law, be at liberty to forfeit the said bid security and the performance guarantee absolutely. I/We agree that in case of forfeiture of Bid security & Performance Guarantee as aforesaid and in the event of deficiency, out of any other money due to Me/Us or otherwise. I/We shall be debarred for participation in the re-tendering process of the work.
7. I/We agree that as an MSE registered/ Startup registered(if applicable) bidder who has availed bid security exemption provision, in case of any default of provisions of bid, the Corporation shall be at liberty to deduct an amount equal to bid security out of any other money due to Me/Us or otherwise with Corporation.
8. I/We hereby declare that I/We shall treat the tender documents drawings and other records connected with the work as secret/confidential documents and shall not communicate information/derived there from to any person other than a person to whom I/We am/are authorized to communicate the same or use the information in any manner prejudicial to the safety of the State.
9. I/We declare that all the information being uploaded by me is genuine, authentic, true and valid on the date of submission of tender and if any information is found to be false at any stage of tendering or contract period. I/We will be liable to the penal actions as prescribed in tender document.
10. I/We declare that in the preparation and submission of the bid, we have not acted in concert or in collusion with any bidder or other persons and not done any act, deed or thing which is or could be regarded as anti-competitive.
11. I/We authorize Corporation for seeking information / clarification from by bankers, clients having reference in this bid.

Kudankulam Nuclear Power Project	Construction of 203 Nos of Residential Quarters comprising of 40 Nos of E-type (G+10 floor-1 Tower), 80 Nos of D-Special quarters (G+10 floor-2 Tower), 80 Nos of B-type quarters (G+10 floor-2 Tower) and 3 Nos of F Type quarters (G+1 floor) at Anuvijay Township.
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12. I/We have uploaded scanned copy of of all relevant documents as prescribed in the tender document in support of the information and data furnished by me/us on e-tendering portal.
13. I/We accept all the undertakings as specified elsewhere in the tender document.
14. I/We accept the Integrity Pact (If applicable as per schedule-A) and shall be bound by its provisions for the work wherever the same is made applicable by the Corporation. The submission of bid shall constitute a binding integrity pact as per the enclosed format between the bidder and Authority calling the tender on behalf of Corporation.
15. I/We confirm that this online agreement will be a part of my bid and if the work is awarded to me /us, this will be a part of our agreement with Corporation.
16. I accept the present and any future revision of NPCIL procedure for banning of business with the bidder/contractor.
17. The bidder declares that none of the e-documents have been tampered with. In case of tampering of e-documents, the bids shall be rejected outright and Bid Security forfeited without prejudice to any other rights or remedies available to Corporation.
18. The person who has signed the tender/bid documents is authorized by the company/firm to upload the bid on its behalf. The Company is responsible for all of my acts and omissions in the tender/bid.
19. I shall comply with the provision of Anti-Profiteering under GST act.
20. Conditions on Public Procurement from certain countries:

Ref: Provisions of F. no. 6/18/2019-PPD Order (Public Procurement No.1) dtd 23.07.2020 and order (Public Procurement No.2) dtd. 23.07.2020 issued by Public Procurement Division, Department of Expenditure, Ministry of Finance, Govt. of India.
"I have read the above referred orders including clause 8,9 and 10 read with Para 1 of "Public Procurement No.1" regarding restriction on procurement from a bidder of a country which shares a land border with India; I certify that this bidder is not from such a country or, if it is from such a country, has been registered with the Competent Authority and will not sub-contract any work to a contractor from such countries unless such contractor is registered with the Competent Authority. I hereby certify that this bidder fulfils all requirements in this regard and is eligible to be considered. (Where applicable, evidence of valid registration by the Competent Authority shall be attached.)"
21. In case of Company, I/We undertake that category of work to be tendered is covered under our AOA (Article of Association) and / Memorandum of Association (MOA).

Accordingly, I am empowered to enter into a contract for this tender.
22. In the event of failure of the contemplated negotiations relating to Tender, original tender/offer shall remain open for acceptance on its original terms and conditions and provisions of the original bidding document remain valid and binding on me.
23. I/we confirm that the submission of bid shall mean absolute acceptance of the undertaking. In case of non-acceptance of the undertaking in part or full shall result in rejection of bid and forfeiture of bid security/performance guarantee/retention money.

Kudankulam Nuclear Power Project	Construction of 203 Nos of Residential Quarters comprising of 40 Nos of E-type (G+10 floor-1 Tower), 80 Nos of D-Special quarters (G+10 floor-2 Tower), 80 Nos of B-type quarters (G+10 floor-2 Tower) and 3 Nos of F Type quarters (G+1 floor) at Anuvijay Township.
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APPENDIX-5

SOLVENCY CERTIFICATE ON LETTER HEAD OF BANK

This is to state that to the best of our knowledge and information that M/s..... having registered office address..... is customer maintaining his accounts with our branch since..... . As per records available with the bank, M/s..... can be treated as solvent up to a limit of Rs..... (Rupees in words.....).

It is clarified that the above information is at the specific request of the customer. This certificate is issued without any guarantee or responsibility on bank or any of the offices.

Name, designation, Signature with seal of bank

Note:

1. Bankers Certificates should be on letter head of the Bank.
2. In case of Partnership firm, certificate should include names of all partners as recorded with the Bank.

Kudankulam Nuclear Power Project	Construction of 203 Nos of Residential Quarters comprising of 40 Nos of E-type (G+10 floor-1 Tower), 80 Nos of D-Special quarters (G+10 floor-2 Tower), 80 Nos of B-type quarters (G+10 floor-2 Tower) and 3 Nos of F Type quarters (G+1 floor) at Anuvijay Township.
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APPENDIX-6
APPLICATION FORM FOR BIDDER FOR ENTERING
SITE IN CONNECTION WITH TENDER/BID FOR CONTRACT WORKS

1.	Name of the person	:	
2.	Name of the firm / company	:	
3.	Age	:	
4.	Details of identification proof *	:	
5.	Designation	:	
6.	Address	:	
7.	Contact No. – Landline/ Mobile No.	:	
8.	E-mail ID	:	
9.	Purpose of visit	:	
10.	Person whom you want to meet	:	
11.	Date of visit	:	
12.	Time of visit	:	
13.	Vehicle No.	:	
14.	Driver's name & age	:	
15.	Additional persons, if any *	:	
	Name	:	
	Age	:	
	Designation	:	
16.	Remarks :	:	

- Photo ID Proof in any form of PAN Card, Voters ID, Bank Pass Book, Ration Card, Driving License, any other ID card issued by Government etc. shall be produced at CISF Main gate for entry. Mobile phones, laptop and any other electronic device are not permitted.

The information given above is true to the best of my knowledge.

Signature of the bidder with date

Kudankulam Nuclear Power Project	Construction of 203 Nos of Residential Quarters comprising of 40 Nos of E-type (G+10 floor-1 Tower), 80 Nos of D-Special quarters (G+10 floor-2 Tower), 80 Nos of B-type quarters (G+10 floor-2 Tower) and 3 Nos of F Type quarters (G+1 floor) at Anuvijay Township.
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APPENDIX-7

PROFORMA FOR UNDERTAKING BY THE CONTRACTOR WITH EACH RA BILL FOR COMPLIANCE OF LABOUR LAWS

I, _____ S/o _____ Proprietor/Partner/Director of _____, do hereby declare and undertake as under:

1. That in the capacity of independent contractor for the Corporation, I have complied with the provisions of all laws as applicable for work order no. _____. I have paid the wages for the month of _____ to all my employees and no other dues are payable to any employee.
2. That I have covered all the eligible employees under Employee's Provident Funds and Miscellaneous Provisions Act and the Employee's State Insurance Act and deposited the contributions for the following months and as such no amount towards contributions whatsoever is payable. The details are enclosed.
3. I have also deposited all the dues related to following :
 - a) BOCW
 - b) GST
4. The documents and information submitted by me in this regards is truthful. I understand that in case the information is found incorrect I, may be debarred from participation in any tender of Corporation for two year.
5. I further declare and undertake that in case any liability pertaining to my employees are to be discharged by the Corporation, due to my lapse, I undertake to reimburse the same. Corporation is authorized to deduct the same from my dues as payable.

(Authorized Signatory of the Contractor)

Kudankulam Nuclear Power Project	Construction of 203 Nos of Residential Quarters comprising of 40 Nos of E-type (G+10 floor-1 Tower), 80 Nos of D-Special quarters (G+10 floor-2 Tower), 80 Nos of B-type quarters (G+10 floor-2 Tower) and 3 Nos of F Type quarters (G+1 floor) at Anuvijay Township.
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APPENDIX-8

Letter of Intent

No.: Dated:

To

(Name and address of the Bidder)

Subject: (Name of the work as appearing in the tender for the work)

Tender no.:-----

Dear Sir (s),

Your tender/bid for the work mentioned above has been accepted for and on behalf of Nuclear power Corporation of India limited at your tendered/negotiated tender/bid amount of Rs.....(Rupees.....only).

- 1) It is requested to submit Performance bank guarantee of amount ₹_____ within ____ days of issue of this letter.
- 2) On receipt of these documents, Work order shall be issued.
- 3) The tentative date of commencement shall be -----.
- 4) Shri_____, will be the Engineer-in-charge of this work & you may contact him for further instructions.

Yours faithfully,

For and on behalf of

Nuclear Power Corporation of India Limited

Kudankulam Nuclear Power Project	Construction of 203 Nos of Residential Quarters comprising of 40 Nos of E-type (G+10 floor-1 Tower), 80 Nos of D-Special quarters (G+10 floor-2 Tower), 80 Nos of B-type quarters (G+10 floor-2 Tower) and 3 Nos of F Type quarters (G+1 floor) at Anuvijay Township.
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APPENDIX-9

(To be submitted on letter head of Bidder/CA as applicable)

Certification under preference to Make in India order

In line with "Public Procurement (preference to make in India) Order 2017 (PPP-MII Order 2017)" issued by Department of Industrial Policy and Promotion (now Department for Promotion of Industry and Internal Trade, DPIIT), Ministry of Commerce and Industry, Government of India vide No - P-45021/2/2017-PP (B.E.-II) dated 15/06/2017, as amended from time to time and as applicable on the date of submission of tender, herein after referred as "PPP-MII Order 2017", it is hereby certified that We/ M/s_____ are _____ (Class I Local Supplier/Class II Local Supplier) local supplier meeting the requirement of minimum local content i.e., _____% as defined in above orders against Tender No.....dated..... Details of location(s) at which local value addition is/will be made is/are as follows:

_____.

Signature with date:

Name:

(Authorized Signatory of the Contractor/ Statutory Auditor /Cost Auditor/Cost Accountant/ Practicing Chartered Accountant details as applicable)

Notes:

- 1) This certificate to be submitted by bidder for work/service with estimated cost put to tender upto Rs. 10 crore.
- 2) For estimated cost put to tender in excess of Rs. 10 crores, Bidder to provide a certificate from the statutory auditor or cost auditor of the company (in the case of companies) or from a practicing cost accountant or practicing chartered accountant (in respect of suppliers other than companies).

Kudankulam Nuclear Power Project	Construction of 203 Nos of Residential Quarters comprising of 40 Nos of E-type (G+10 floor-1 Tower), 80 Nos of D-Special quarters (G+10 floor-2 Tower), 80 Nos of B-type quarters (G+10 floor-2 Tower) and 3 Nos of F Type quarters (G+1 floor) at Anuvijay Township.
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APPENDIX-10

Format for self-certification for Proprietorship firm

(To be signed, scan and upload by bidder)

Name of Entity:

Name of Proprietor:

I, _____, solemnly declare that I am the Sole Proprietor and DSC Holder of the said firm.

Signature of Bidder

Kudankulam Nuclear Power Project	Construction of 203 Nos of Residential Quarters comprising of 40 Nos of E-type (G+10 floor-1 Tower), 80 Nos of D-Special quarters (G+10 floor-2 Tower), 80 Nos of B-type quarters (G+10 floor-2 Tower) and 3 Nos of F Type quarters (G+1 floor) at Anuvijay Township.
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APPENDIX-11

Form for Certificate of Net Worth from Chartered Accountant

(This is an indicative sample format. However, details indicated in the format shall be covered)

"It is to certify that as per the audited balance sheet and profit & loss account during the financial year, the Net Worth of M/s(Name and Registered Address of individual/firm/company), as on is ₹after considering all liabilities. It is further certified that the Net Worth of the Company has not eroded by more than 30% in the last three audited financial years previous to the last day of month previous to the commencement date of sale/download of tender."

Net Worth shall mean aggregate value of the paid-up share capital and all reserves created out of the profits and securities premium account, after deducting the aggregate value of the accumulated losses, deferred expenditure and miscellaneous expenditure not written off, as per the audited balance sheet, but does not include reserves created out of revaluation of assets, write back of depreciation and amalgamation.

Signature of Chartered Accountant.....

Name of Chartered Accountant.....

Membership No./FRN of ICAI.....

Date and Seal with UDIN.....

Kudankulam Nuclear Power Project	Construction of 203 Nos of Residential Quarters comprising of 40 Nos of E-type (G+10 floor-1 Tower), 80 Nos of D-Special quarters (G+10 floor-2 Tower), 80 Nos of B-type quarters (G+10 floor-2 Tower) and 3 Nos of F Type quarters (G+1 floor) at Anuvijay Township.
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APPENDIX-12

Self Declaration on Proceedings under Insolvency and Bankruptcy Code (IBC)

(This is an indicative sample format. However, details indicated in the format shall be covered)

Tender No.: Name of Work:

Bidder's Name:

I /We, M/s.....declare that:-

- (i) I / We am / are not undergoing insolvency resolution process or liquidation or bankruptcy proceeding under Insolvency and Bankruptcy Code, 2016 or as amended from time to time as on date.
- (ii) I / We am / are undergoing insolvency resolution process or liquidation or bankruptcy proceeding as on date as per details mentioned below.

Note: *Strike out one of above which is not applicable.*

It is understood that if this declaration is found to be false, Nuclear Power Corporation of India Ltd. shall have the right to reject my / our bid, and forfeit the EMD, if the bid has resulted in a contract, the contract will be liable for termination without prejudice to any other right or remedy (including banning/holiday listing) available to NPCIL.

Date:

Signature of Bidder with Name and stamp of Signatory

Kudankulam Nuclear Power Project	Construction of 203 Nos of Residential Quarters comprising of 40 Nos of E-type (G+10 floor-1 Tower), 80 Nos of D-Special quarters (G+10 floor-2 Tower), 80 Nos of B-type quarters (G+10 floor-2 Tower) and 3 Nos of F Type quarters (G+1 floor) at Anuvijay Township.
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APPENDIX -13

Deviations to Tender Conditions

BIDDERS TO MAKE AND ATTACH WITH PART-I BID

Appendix -14**Appendix-QR Document Authentication process****Verification of authenticity of Documents submitted by the bidder in support of meeting the QR (Qualifying Requirement)**

- a) The Bidder who wish to participate in tender shall be required to submit duly certified (i.e., digitally signed) and verified documents from its Independent Statutory Auditor (ISA) or any of the specified TPIA (*Third Party Inspection Agencies*) in support of meeting QR (Qualifying Requirement (*viz. Technical, Financial & Commercial*)) along with a certificate/undertaking regarding verification of authenticity of documents as per proforma attached (i.e., **Annexure-I or Annexure-II**, as the case may be) before the due date of submission of the bids. All the documents (including the Annexure-I or Annexure-II, as the case may be) submitted by the bidder in support of meeting QR shall be digitally signed by Independent Statutory Auditor or any of the above specified TPIA.
- b) Bidder shall submit PDF document(s) that are digitally signed by Independent Statutory Auditor or any of the specified TPIA mentioned in Annexure-III as follows:
 - i. Bidder must obtain the digitally signed PDF document(s) only from the Independent Statutory Auditor or any of the specified TPIA.
 - ii. Bidder should upload only the same digitally signed PDF document as obtained from TPIA/ISA.
- c) In case documents are certified & verified for authenticity through TPIA, the verification and certification of authenticity of documents is acceptable from any of the TPIAs as mentioned in **Annexure-III**. However, Bidders must verify the accreditation validity of the designated TPIA before proceeding to engage them for document certification.
- d) The following website may be referred for contact details and accreditation validity of above mentioned TPIAs:
<https://nabcb.qci.org.in/inspection-body/>
- e) These certified (i.e., *digitally signed*) & verified documents (*by either independent Statutory Auditor of Bidder or TPIA*) shall only be considered to ascertain the bidder's compliance to QR. Any document pertaining to QR, which is not certified by specified TPIA or Statutory Auditor of the bidder, and submitted along with a certificate/undertaking as per the proforma attached (i.e., **Annexure-I or Annexure-II**, as the case may be) shall not be considered verified/ certified for the purpose of evaluation, and the bid shall be liable for rejection as being non-responsive.
- f) The Bidder shall be responsible to get their documents/ credentials in support of QR verified & certified by their Independent Statutory Auditor(s) and/ or specified TPIAs. All the costs of independent statutory auditor or TPIA pertaining to third party verification and certification shall be borne by the Bidder. Employer/ Buyer shall have no liability (financial or otherwise) towards the same and shall not be liable for any claim/ dispute between the bidder and TPIA and/ or Independent Statutory Auditor.
- g) In case a bidder submits documents / credentials duly certified/verified by its Independent Statutory Auditor or specified TPIA for an earlier tender of NPCIL, the same can be submitted in present tender and would be acceptable to be considered for purpose of evaluation subject to fulfilment of QR as stipulated in tender/bid document.
- h) Where appointment of Independent Statutory Auditor is mandatory as per statute under which bidder has been incorporated, such bidder has the option to submit the duly certified and verified documents from any of the specified TPIA or by its Independent

Kudankulam Nuclear Power Project	Construction of 203 Nos of Residential Quarters comprising of 40 Nos of E-type (G+10 floor-1 Tower), 80 Nos of D-Special quarters (G+10 floor-2 Tower), 80 Nos of B-type quarters (G+10 floor-2 Tower) and 3 Nos of F Type quarters (G+1 floor) at Anuvijay Township.
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dent Statutory Auditor in support of meeting QR along with attached Annexure – I/Annexure – II. Documents certified and verified by TPIA or Independent Statutory Auditor or a combination of both agencies are acceptable.

- i) It is clarified that where appointment of independent Statutory Auditor is not mandatory as per statute under which bidder has been incorporated, the option of certification from specified TPIA shall only be considered for such bidder and such bidder has to submit the duly certified and verified documents from any of the specified TPIA in support of meeting QR along with attached Annexure – II only.
- j) The credentials which are required to be self-filled (i.e., not issued by third party viz. client, CA etc) and submitted by Bidders as per proforma (i.e., Formats/Annexures/Appendix) mentioned in tender-document as well as self-undertaking(s) required to be submitted in compliance of QR need not to be certified & verified for authenticity through Independent statutory auditor or TPIA.
- k) List of QR related documents required to be certified & verified for authenticity from Independent Statutory Auditor or TPIA as mentioned in **Annexure-IV**.
- l) NPCIL reserves the rights of getting the documents cross verified from the documents issuing authority. NPCIL reserves the right to call upon the bidder to produce original of all the documents uploaded for meeting QR for verification at any stage.
- m) Moreover, Submission of bid by bidder shall mean unconditional and absolute acceptance of the below mentioned undertaking. In case of any deviation to the below mentioned undertaking in part or full, it shall result in disqualification and rejection of bid.

Undertaking from Bidder

All the QR documents and credentials submitted/uploaded as a part of this tender have been verified from the Original Documents and/ or Client for authenticity by Independent Statutory Auditor or TPIA (as the case may be).

It is certified that none of the documents are false/forged or fabricated. All the documents submitted have been made having full knowledge of

- i) The provisions of the Indian laws in respect of offences including but not limited to those pertaining to criminal breach of trust, cheating & fraud and
- ii) Provisions of bidding/tender conditions which entitle NPCIL to initiate appropriate action in the event of such declaration turning out to be a misrepresentation or a false representation.

It is further certified that additional documents, if any required to be submitted by us (Bidder) on request of NPCIL shall be submitted under my (Bidder's) knowledge duly verified from the Original Documents and/ or Client for authenticity by Independent Statutory Auditor or TPIA (as the case may be) and those documents shall also be true, authentic, genuine, exact copy of its original & shall not be false/forged or fabricated."

Kudankulam Nuclear Power Project	Construction of 203 Nos of Residential Quarters comprising of 40 Nos of E-type (G+10 floor-1 Tower), 80 Nos of D-Special quarters (G+10 floor-2 Tower), 80 Nos of B-type quarters (G+10 floor-2 Tower) and 3 Nos of F Type quarters (G+1 floor) at Anuvijay Township.
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Annexure-I

Format Undertaking from Independent Statutory Auditor

(On **letter head digitally signed** by a person duly authorized to Sign on behalf of the Statutory Auditor)

Ref. No:

Date:

To,

NPCIL

.....

Subject: Authentication of veracity of documents submitted by M/s (*Bidder's Name & PAN Number*) in support of meeting the QR (*Qualifying Requirements*) reg.

Ref :

Bid no./Tender no......

Name of the Work/ Tender:.....

Dear Sir,

M/s.....(hereinafter called Bidder) having Registered office at..... intend to participate in above referred tender of NPCIL having registered office at 16th Floor, Centre I World Trade Centre, Cuffe Parade, Colaba, Mumbai 400005- India.

We, M/s has been appointed as Independent Statutory Auditor for the Bidder i.e. M/s..... (*Relevant documents on our appointment attached*).

The tender condition stipulates that the bidder shall submit supporting Documents pertaining to QR duly verified and certified by Independent Statutory Auditor of Bidder.

In this regard, it is hereby confirmed that we have examined the following documents, which are also attached with this letter. The same has been verified from the Original Documents and/ or Client for authenticity.

We hereby confirm that the following documents are found to be genuine and authentic:

S. No.	Document reference no. & date	Name of Document
1.		
2.		
3.		
.....(so on)

All the aforesaid documents have been digitally signed by us as a certificate of authenticity.

*Further, we have examined the books of accounts, records, and other relevant documents, along with other necessary information and explanations furnished by M/s..... (*bidder's name*) and hereby certify following:

.....

This certificate is issued at the request of M/s (*bidder's name*) for the purpose of participating in tender/s.

Thanking you,

.....

* *Strike off, whichever is not applicable.*

Kudankulam Nuclear Power Project	Construction of 203 Nos of Residential Quarters comprising of 40 Nos of E-type (G+10 floor-1 Tower), 80 Nos of D-Special quarters (G+10 floor-2 Tower), 80 Nos of B-type quarters (G+10 floor-2 Tower) and 3 Nos of F Type quarters (G+1 floor) at Anuvijay Township.
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Annexure-II

Format for Undertaking from TPIA (Third Party Inspection Agency) **(on letter head digitally signed by a person duly authorized to Sign on behalf of the TPIA)**

(Mandatory in case of bidders where the appointment of statutory Auditors is not mandatory as per statute under which bidder has been incorporated (viz. Proprietorship, Partnership firms etc.))

Ref. No.:

Date:

To,
NPCIL

.....

Subject: Authentication of veracity of documents submitted by M/s *(Bidder's Name & PAN Number)* in support of meeting the Qualifying Requirements (QR) reg.

Ref:

Bid no./ Tender no.

Name of the Work/Tender:

Dear Sir,

M/s. *(hereinafter called Bidder)* having Registered office at intend to participate in above referred tender of NPCIL having registered office at 16th Floor, Centre I World Trade Centre, Cuffe Parade, Colaba, Mumbai 400005- India.

The tender condition stipulates that the bidder shall submit supporting Documents pertaining to QR duly verified and certified by a specified independent TPIA as per the list mentioned in the tender/bid document.

In this regard, it is hereby confirmed that we have examined the following documents, which are also attached with this letter. The same has been verified from the Original Documents and / or Client for authenticity.

We hereby confirm that the following documents are found to be genuine and authentic:

S. No.	Document reference no. & date	Name of Document
1.		
2.		
3.		
.....(so on)

All the aforesaid documents have been digitally signed by us as a certificate of authenticity.

We further confirm that we neither have any vested interest in aforesaid tender nor have any conflict of interest in respect of above tender.

We further confirm that we are registered under NABCB accredited Inspection bodies who have been accredited as per the requirement of ISO/IEC 17020 as Type 'A' in QCI's NABCB website (<https://nabcb.qci.org.in/inspection-body/>) and our accreditation is valid as on the date of issue of this undertaking.

This certificate is issued at the request of M/s *(bidder's name)* for the purpose of participating in the subject tender/s.

Thanking you,

.....

Kudankulam Nuclear Power Project	Construction of 203 Nos of Residential Quarters comprising of 40 Nos of E-type (G+10 floor-1 Tower), 80 Nos of D-Special quarters (G+10 floor-2 Tower), 80 Nos of B-type quarters (G+10 floor-2 Tower) and 3 Nos of F Type quarters (G+1 floor) at Anuvijay Township.
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Details of TPIA (Third Party Inspection Agencies)-consent obtained for inclusion in NPCIL list of TPIAs					
S. No.	TPIA Name	Email Address	Phone no.	Contact Person Name	Address (mostly Main Office or Head Office Address)
1	Aaditech Inspections & Services Private Limited	info@aaditech.co.in ; aaditeche@gmail.com	(+91)-9810927632; 011-43044550	Bijendra Kumar Jain, Director	268, Aggarwal City Plaza. Sector-3, Rohini, New Delhi-110085
2	Adornment Engineers India Private Limited	jks@adornmentengineers.com	+91-9982114444, +91-129-298-9444	Jitendra Kumar Sharma, MD & CEO	Plot No. 46, 2 nd Floor, Wazir Market, Main Bye Pass Road, Faridabad, Haryana-121004
3	Alfred H Knight India Private Limited	jitendra.sawant@ahkgroup.com enquiries.india@ahkgroup.com	+91-9819068960, +91-22-4964 1456	Jitendra Sawant, General Manager	Unit No.506 & 507,5 th Floor, Hubtown Solaris,Saiwadi, N.S. Phadke Road, Andheri (East), Mumbai, Maharashtra- 400069
4	Apave TIV India Private Limited	india.tiv@apave.com ; kamal.prasad@apave.com	+91 9833221154; +91-22-41734173/ 27578780	Kamal Prasad, Senior Manager	Lakhani's Centrium, 6 th Floor, Plot No.27, Sector 15, CBD Belapur, Navi Mumbai, Maharashtra - 400614
5	Applus India Private Limited	Akshaymula.Kumar@applus.com Info.india@applus.com	+91 76709 03775/+91 90142 01951 +91 40 29709499	1) Vasamsetty Naga Venkata Ramana Krishna, Director 2) Akshay Kumar Mula	#504, 5 th Floor, Gowra Grand, Behind Gowra Plaza, 1-8-384 & 385, Sardar Patel Road, Secunderbad- 500003, Telangana.
6	Aspira Certifications Private Limited	karthiga.s@aspiracertifications.com info@aspiracertifications.com	+91 -7094240721/ +91-9626776868	S Karthiga, Managing Director	New No. 111, Old No. 141, Rajiv Gandhi Salai, Old Mahabalipuram Road, Kottivakkam Village, Thiruvannamiyur, Chennai, Tamilnadu- 600041
7	Assure Quality Management Certification Services Pvt Ltd	aqmcs@aqmcs.com	+91 9216183238/ 9216283238	Joginder Singh, Director	1172, Sector-11, Panchkula- 134109, Tricity Chandigarh
8	Brajvidhya Services Private Limited	suryavanshipankaj76@gmail.com info@brajvidhya.com	+91-9229265444/ +91-9229275444	Pankaj Suryavanshi, CEO/IB Head	B-1, 1 st Floor, Shopping Complex, Near HDFC Bank, Omax City 1 st Indore

Kudankulam Nuclear Power Project	Construction of 203 Nos of Residential Quarters comprising of 40 Nos of E-type (G+10 floor-1 Tower), 80 Nos of D-Special quarters (G+10 floor-2 Tower), 80 Nos of B-type quarters (G+10 floor-2 Tower) and 3 Nos of F Type quarters (G+1 floor) at Anuvijay Township.
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Details of TPIA (Third Party Inspection Agencies)-consent obtained for inclusion in NPCIL list of TPIAs					
S. No.	TPIA Name	Email Address	Phone no.	Contact Person Name	Address (mostly Main Office or Head Office Address)
9	Bureau Veritas (India) Pvt. Ltd.	bvindia.corporate@bureauveritas.com	+91-8291417728/ +91-22-62742000	1) Bholashankar Kandpal, Director 2) Vilas Joglekar	72, Business Park, Ground Floor, Marol Industrial Area, MIDC Cross Road 'C', Andheri (East), Mumbai - 400 093
10	Competent Inspectorate and Consultants Private Limited	drrama@cicpl.co	+91 99121 92500, +91-40-23072500	Rama Dasu Pittala, Managing Director	#104,203-Park View, Plot Nos 5 & 6, Pushpak Cooperative Housing Society Prashantinagar Industrial Estate, Kukatpally, Hyderabad - 500072
11	Conformity India International Private Limited	mtkg@ciindia.in	+91-9953325352/011-28114433/55	Himani Sharan, Director	A-33, 2 nd Floor, Mayapuri Industrial Area, Phase-1, New Delhi 110064
12	DYC Global Private Limited	parag.wadekar@dycgpl.com	+91 8879663355, +91 2249628259	Parag D. Wadekar, Managing Director	702, Lodha Supremus District 2, Kolshet Road, Thane West- 400607.
13	Edlipse Engineering Global Pvt. Ltd.	marketing@edlipse.com , sunil@edlipse.com	+91-9910502293	Sunil Verma, Director	A-802, Sugar Palm, Omaxe Palm Greens Society, Sector-MU, Greater Noida 201308
14	Electrical Research And Development Association	Rajib.chattopadhyay@erda.org	+91-9978940954, +91-26-53043128	Rajib Chattopadhyay, Dy. Director	ERDA Road, G.I.D.C., Makarpura, Vadodara – 390010, Gujarat
15	Geocoal Engineering Private Limited	geocoalindia@gmail.com geocoalengineering@gmail.com	+91-9471191196, +91-7979834082	Rajkumar Soni, Director	Janki Complex, Bara Jamua, Barwadda, Dhanbad – 826004, Jharkhand

Kudankulam Nuclear Power Project	Construction of 203 Nos of Residential Quarters comprising of 40 Nos of E-type (G+10 floor-1 Tower), 80 Nos of D-Special quarters (G+10 floor-2 Tower), 80 Nos of B-type quarters (G+10 floor-2 Tower) and 3 Nos of F Type quarters (G+1 floor) at Anuvijay Township.
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Details of TPIA (Third Party Inspection Agencies)-consent obtained for inclusion in NPCIL list of TPIAs					
S. No.	TPIA Name	Email Address	Phone no.	Contact Person Name	Address (mostly Main Office or Head Office Address)
16	Gulf Lloyds (India) Ltd	contact@gulflloyds.com inspection.glis@gmail.com	+91 9870062828, +91-79-48001320	Akash Dhobi Jaykumar Bhavsar, Director	910,GALA Empire, Opp. TV Tower, Drive-in Road, Ahmedabad-380052, Gujarat
17	Hertz Inspection & Services Pvt. Ltd.	hertz.1973@gmail.com	+91 8154006502/+91 9998900073	Dhaval Kumar Jentilal Suvagiya, CEO	A-27, "JAY RAJ" Shyamli Society, B/H Samta Party Plot, Petlad Road At Nadiad. PIN. 387002. Dist. Kheda (Gujarat)
18	ICS INDIA PVT. LTD	icsindiamarketing@gmail.com	+91-9822841076	Nitin B Patil, Managing Director	305-310, Nawu Imperio, Beside Lodha Belmondo, Opposite MCA Cricket Stadium, Gahunje, Pune -412101
19	Inspectorate Griffith India Pvt.Ltd.	Pushpendu.nag@bureauveritas.com calhq@bureauveritas.com	+91-9836687382, +91-33-66446600	Pushpendu Nag, Assistant Manager	Ecocentre, 16 th Floor, Unit-1601, Block-EM04, Salt Lake City, Sector-V, Kolkata-700091, West Bengal
20	IRC Engineering Services India Private Limited	abhinavsinghi@ircengg.co.in	+91-9810401316, 011- 26468092	Abhinav Singhi, Director	A-53, Sector-63, Noida, Uttar Pradesh- 201301
21	IRCLASS Systems and Solutions Pvt Ltd	ks.mhaskar@irclass.org ; industrial_services@irclass.org	+91-9869333204/ +91-8850783112; (+91)-22-30519400/ 022-71199 400	Kiran S Mhaskar, General Manager	Industrial Services (6th Floor), 52-A, Adi Shankaracharya Marg, Opposite Powai Lake, Powai, Mumbai-400072, Maharashtra
22	KARANDIKAR LABORATORIES PRIVATE LIMITED	sales@karandikarlab.com	+91-9223324548/ 022-28471395/97/98	Shishir Ajit Karandikar, Director	B-101, Ansa Ind.Estate, Saki Vihar Road, Saki Naka, Andheri(E), Mumbai-400072

Kudankulam Nuclear Power Project	Construction of 203 Nos of Residential Quarters comprising of 40 Nos of E-type (G+10 floor-1 Tower), 80 Nos of D-Special quarters (G+10 floor-2 Tower), 80 Nos of B-type quarters (G+10 floor-2 Tower) and 3 Nos of F Type quarters (G+1 floor) at Anuvijay Township.
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Details of TPIA (Third Party Inspection Agencies)-consent obtained for inclusion in NPCIL list of TPIAs					
S. No.	TPIA Name	Email Address	Phone no.	Contact Person Name	Address (mostly Main Office or Head Office Address)
23	KBS Certification Services Pvt. Ltd.	director@kbsindia.in tender@kbsindia.in	+91-9560995216, +91-129 4054513, +91-129 4178071	Kaushal Goyal, Managing Director	414-424, Om Shubham Tower, Neelam Bata Road, NIT Faridabad-121001, Haryana
24	Meenaar Global Consultants LLP	NKN@MGCLLP.IN	+91-9810755700	NK Narang, CEO	Suite 152-153, First Floor, Tower-D, Vatika Mindscapes, 12/3 Mathura Road, NH2, Sector-27D Faridabad, Haryana – 121003
25	Moody International India Pvt Ltd.	Nagendra.singh@intertek.com	+91-9899143415, 022-42450100	Nagendra Pratap Singh, Sales Manager	Intertek House “F” – Wing, Tex centre, Chandivali Farm Road, Andheri (East), Mumbai – 400 072, Maharashtra
26	Quality Austria Central Asia Private Limited	pankaj.srivastava@qacamail.com	+91 9818161110	Pankaj Srivastava, Director-Commercial	ATS Bouquet, Tower-C, Second Floor, 201, Sector-132, Noida-201301
27	Ravi Energie Private Limited	baroda@ravienergie.com ,	+91 97277 21740/ +91 9313407126; +91-265-298-6677	Smita M. Joshi, Director. Shraddha Ladani	S-15 A/B India Bulls Mega Mall Jetalpur Road Vadodara, 390020, Gujarat
28	RINA INDIA PVT LTD	jose.rivera@rina.org	+91 99874 18269	Jose Roberto Rivera Alas, Director	607/608, Everest Chambers, Marol Naka, Andheri – Kurla Road, Andheri (East), Mumbai- 400 059
29	rites Limited	wriospn@rites.com	+91-8600017719; 022-68943400	Koteswara Rao Donepudi, General Manager	HO: Shikhar, Plot No. 1, Sector-29, Gurugram- 122001, Haryana

Kudankulam Nuclear Power Project	Construction of 203 Nos of Residential Quarters comprising of 40 Nos of E-type (G+10 floor-1 Tower), 80 Nos of D-Special quarters (G+10 floor-2 Tower), 80 Nos of B-type quarters (G+10 floor-2 Tower) and 3 Nos of F Type quarters (G+1 floor) at Anuvijay Township.
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Details of TPIA (Third Party Inspection Agencies)-consent obtained for inclusion in NPCIL list of TPIAs					
S. No.	TPIA Name	Email Address	Phone no.	Contact Person Name	Address (mostly Main Office or Head Office Address)
30	RSJ Inspection Service Limited (RSJ)	sonalsaggi@rsjqa.com	+91 9811873734/ +91 9535921324; 022-4131 5070	Sonal Saggi, Director	B-58, 2 nd Floor, Sector – 60, Noida (UP) 201301
31	SGS INDIA PVT. LTD.,	manjiri.thakurdesai@sgs.com sgs.india@sgs.com	+91 7738551460/ +91 22 6640 8888	Manjiri Abhijit Sant, Principal Manager	NITCO BIZ PARK, 5 th Floor, Plot No. C/19, Road 19, Wagle Industrial Estate MIDC, Thane (West) – 400604, Maharashtra
32	STEM INTEC LLP	bvimal@stemgroup.co.in	+91-22-49711145/ +91-22-27571145/ +09820304774	Bharatendu Vimal, CEO	B-212, 2 nd Floor, ITC Park, Tower No. 09, Belapur Railway Station Complex, Sector-11, CBD Belapur, Navi Mumbai – 400614
33	Sunkonnect Advisory Services Private Limited	manoj.k@sunkonnect.co info@sunkonnect.co	+91 9205111377, +91 124 446 8289	Manoj Kumar, Vice President – BD	Unit No: 301-304. JMD Empire, Golf Course Extension Road, Sector -62, Gurgaon, Haryana, India – 122102
34	TCRC Inspections Private Limited	tenders@tcrcgroup.com	+91-7045940446	1) Samapti Bhupendra Patel, Director 2) Rohan Thorat, Asst Manager Marketing	4 th Floor, 402, Shiv Industrial Estate, KV Balmukund Marg, Chinchpokli East, Mumbai, Maharashtra – 400012
35	TQ Cert Services Private Limited	tqcert@tataprojects.com	+91 7729007444; +91 40 6631 8801/ 6725 8800	1) Sarat Chandra Pradhan, Asst. Vice President 2) Gutlapalli Jaya Bharath, Senior Manager	Splendid Tower 6 th Floor H No 1-8-364,437,438 & 445 S P Road Begumpet Hyderabad-500003 Telangana

Kudankulam Nuclear Power Project	Construction of 203 Nos of Residential Quarters comprising of 40 Nos of E-type (G+10 floor-1 Tower), 80 Nos of D-Special quarters (G+10 floor-2 Tower), 80 Nos of B-type quarters (G+10 floor-2 Tower) and 3 Nos of F Type quarters (G+1 floor) at Anuvijay Township.
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Details of TPIA (Third Party Inspection Agencies)-consent obtained for inclusion in NPCIL list of TPIAs					
S. No.	TPIA Name	Email Address	Phone no.	Contact Person Name	Address (mostly Main Office or Head Office Address)
36	TUV India Private Limited	salim@tuv-nord.com mumbai@tuv-nord.com	+91 9958678982, (022) 66477000	Salim Khan, General Manager	801, Raheja Plaza I, L.B.S. Marg, Ghatkopar (West), Mumbai – 400 086, Maharashtra
37	TUV Rheinland (India) Pvt.Ltd.	anil.goud@ind.tuv.com , info@ind.tuv.com	+91-9538866444, +91-804649 8000	Anilkumar Goud, Manager	27/B, 2 nd Cross Road Electronics City Phase I, Bangalore – 560 100 Karnataka, India.
38	TUV SUD South Asia Pvt. Ltd.	Manish.Mondkar@tuvsud.com	+91 7391005745, +91-22-67545555	Manish Mondkar, Senior Manager	TUV SUD House, Off. Saki Vihar Road, Saki Naka, Andheri (E), Mumbai- 400072, Maharashtra
39	VCS Quality Services Pvt Ltd	mktg2@vcsprojects.com	+91-8750952823, +91-8287611343	Shaker Vayuvegula, Director	505,5 th Floor, 360 Degree Business Park, L.B.S Marg, Mulund, West Mumbai – 400080
40	Vedokt Skill and Consulting Private Limited	coo@vedokt.com ; operations@vedokt.com	+91-9009493191/ 8989292265; 0731-4003666	Ashish Yadav, Chief Operating Officer	305-B, N.M.Tower, 1, New Palasia, 56 Shop, Indore, Madhya Pradesh-452001

Kudankulam Nuclear Power Project	Construction of 203 Nos of Residential Quarters comprising of 40 Nos of E-type (G+10 floor-1 Tower), 80 Nos of D-Special quarters (G+10 floor-2 Tower), 80 Nos of B-type quarters (G+10 floor-2 Tower) and 3 Nos of F Type quarters (G+1 floor) at Anuvijay Township.
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Annexure-IV

List of QR/PQ related documents required to be certified & verified for authenticity from Independent Statutory Auditor or TPIA

Sr. no.	NIT clause no	List of Documents uploaded by bidder which are required to be verified & certified for authenticity from Independent Statutory Auditor of bidder or Third Party Inspection Agencies (TPIA)
1	1.0, Format - 2, Format - 4 & Format - 6 of NIT	<p>Work experience:</p> <p>The bidder shall upload details of each work executed by them in the excel sheet (Format-2 of NIT) with documentary proof for the works to be considered for qualification of work experience criteria as per clause no: 1.3.5 of NIT.</p> <p>Also the bidder shall upload the details of work executed by them in the excel sheet i.e., Format-4 of NIT (for works executed for clients other than Government/Government Autonomous bodies/Public Sector Units) & Format-6 of NIT (Work Experience in Foreign Country) with documentary proof for the works to be considered for qualification of work experience criteria as per clause no: 1.3.5.2 and 1.3.7 of NIT.</p> <p>All Documents uploaded by the bidder as a documentary proof in support of work experience as mentioned above shall be verified & certified for authenticity from Independent Statutory Auditor of bidder or Third Party Inspection Agencies (TPIA).</p>
2	2.0 Format - 3 of NIT	<p>Financial criteria:</p> <p>The bidder shall upload details containing Financial data viz. Annual turnover, Profit before tax, Net worth in a certificate (as per Format-3 of NIT) duly certified by practicing Chartered Accountant on his letterhead with seal, signature, membership number/ FRN and UDIN. Also, Bidder shall fill & upload the data in excel sheet (as per Format-3 of NIT) as mentioned in the certificate for consideration of Financial criteria qualification as per clause no: 2.1, 2.2, 2.3 & 2.5.1 of NIT.</p> <p>The Financial data (Format-3 of NIT) uploaded in support of Financial criteria as mentioned above shall be verified & certified for authenticity from Independent Statutory Auditor of bidder or Third Party Inspection Agencies (TPIA).</p>
3	2.3 Appendix-5 Appendix-11 of NIT	<p>Financial criteria:</p> <p>The bidder shall upload details of Bank solvency certificate (Appendix-5 of NIT) or Net worth certificate (Appendix-11 of NIT) or Copy of rating certificate/certified pdf copy of relevant pages of Annual report reflecting Credit Rating or Documentary evidence regarding line of credit from a Nationalized/any Scheduled bank other than Cooperative Bank for consideration of Financial criteria qualification as per clause no: 2.3 of NIT.</p> <p>The Financial data uploaded in support of Financial criteria as mentioned above shall be verified & certified for authenticity from Independent</p>

Kudankulam Nuclear Power Project	Construction of 203 Nos of Residential Quarters comprising of 40 Nos of E-type (G+10 floor-1 Tower), 80 Nos of D-Special quarters (G+10 floor-2 Tower), 80 Nos of B-type quarters (G+10 floor-2 Tower) and 3 Nos of F Type quarters (G+1 floor) at Anuvijay Township.
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		Statutory Auditor of bidder or Third Party Inspection Agencies (TPIA).
4	2.4 Format - 7 of NIT	<p>Bid Capacity:</p> <p>The bidder shall upload details of Bid capacity (as per Format-7 of NIT) duly certified by practicing Chartered Accountant / Company Auditor on his letterhead with seal, signature, membership number/ FRN and UDIN. Also, Bidder shall fill & upload the data in excel sheet (as per Format-7 of NIT) as mentioned in the certificate for consideration of Financial criteria qualification as per clause no: 2.4 of NIT.</p> <p>The Bid capacity data (Format-7 of NIT) uploaded in support of Financial criteria as mentioned above shall be verified & certified for authenticity from Independent Statutory Auditor of bidder or Third Party Inspection Agencies (TPIA).</p>

Note to Bidder:

Certified & verified documents (by either Independent Statutory Auditor of bidder or TPIA) uploaded by bidder shall only be considered for evaluation. Any document uploaded by bidder which is not certified by specified TPIA or Independent Statutory Auditor of bidder shall not be considered for the purpose of evaluation.

SECTION II

MEMORANDUM OF AGREEMENT

Kudankulam Nuclear Power Project	Construction of 203 Nos of Residential Quarters comprising of 40 Nos of E-type (G+10 floor-1 Tower), 80 Nos of D-Special quarters (G+10 floor-2 Tower), 80 Nos of B-type quarters (G+10 floor-2 Tower) and 3 Nos of F Type quarters (G+1 floor) at Anuvijay Township.
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SECTION – II

NUCLEAR POWER CORPORATION OF INDIA LTD. (A Government of India Enterprise) Kudankulam Nuclear Power Project.

ITEM RATE TENDER AND CONTRACT FOR WORKS

FORM OF TENDER AND GENERAL RULES AND DIRECTIONS FOR THE GUIDANCE OF CONTRACTOR

1. This form will state the amount of security deposit to be deposited by the successful tenderer and the percentage, if any to be deducted from the bills. Copies of the specifications, designs and drawings and any other documents required in connection with the work signed for the purpose of identification by the Engineer shall also be open for inspection by the contractor at the office of the “Engineer” during office hours.
2. In the event of the tender being submitted by a firm, it must be signed separately by each member thereof, or in the event of absence of any partner, it must be signed on his behalf by a person holding a power of attorney authorizing him to do so, such power of attorney to be produced with the tender, and it must disclose that the firm is duly registered under the Indian Partnership Act.
3. Receipt of payments made on account of a work, when executed by a firm, must also be signed by several partners except where the contractors are described in their tender as a firm, in which case the receipts must be signed in the name of the firm by one of the partners, or by some other person having authority to give effectual receipt for the firm.

Kudankulam Nuclear Power Project	Construction of 203 Nos of Residential Quarters comprising of 40 Nos of E-type (G+10 floor-1 Tower), 80 Nos of D-Special quarters (G+10 floor-2 Tower), 80 Nos of B-type quarters (G+10 floor-2 Tower) and 3 Nos of F Type quarters (G+1 floor) at Anuvijay Township.
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MEMORANDUM OF AGREEMENT

I/We hereby tender for the execution for Nuclear Power Corporation of India Ltd. of the work specified in the under written Memorandum within the time specified in such memorandum at the rate specified therein, and in accordance in all respects with the specifications, designs, drawings and instructions in writing referred to in Rule 1 hereof and in clause 12 of the General Conditions of Contract and with such materials as are provided for, by and in all respects in accordance with, such conditions so far as possible.

MEMORANDUM

- a) **General Description** : **Construction of 203 Nos of Residential Quarters comprising of 40 Nos of E-type (G+10 floor-1 Tower), 80 Nos of D-Special quarters (G+10 floor-2 Tower), 80 Nos of B-type quarters (G+10 floor-2 Tower) and 3 Nos of F Type quarters (G+1 floor) at Anuvijay Township**
- b) **Estimated Cost** : **As per Clause No: 4 of General Details of NIT**
- c) **Bid Security** : **As per Clause No: 5 of General Details of NIT**
- d) **Security deposit** : **As per Clause No: 4.2 of General Conditions of Contract**
- e) **Time of completion** : **As per Clause No: 8 of General Details of NIT**
1. Total Security Deposit (SD) shall be calculated as under
- (i) Contract value up to ₹100 Crores - 10% of Contract Value.
 - (ii) Contract value more than ₹ 100 Crores - 5% of Contract Value subject to a minimum of ₹ 10 Crores.

Note: The contract value for the purpose of this clause shall be taken as the value of the contract awarded.

- i. Security Deposit as calculated based on above parameters shall be split in the following of two parts and furnished accordingly:

Section - II	Form of Tender and General rules & Directions for the Guidance of Contractor	Page 2 of 5
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Kudankulam Nuclear Power Project	Construction of 203 Nos of Residential Quarters comprising of 40 Nos of E-type (G+10 floor-1 Tower), 80 Nos of D-Special quarters (G+10 floor-2 Tower), 80 Nos of B-type quarters (G+10 floor-2 Tower) and 3 Nos of F Type quarters (G+1 floor) at Anuvijay Township.
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- a. Performance Guarantee to be submitted on award of work (50% of Security Deposit), and
- b. Retention money to be recovered from Running Bills (50% of Security Deposit).
- ii. **Performance Guarantee:** The Contractor shall deliver the Performance Guarantee to the Corporation within 30 days after issue of work order. The Performance guarantee shall be issued by an entity and from within the country approved by the Employer, and shall be in the form of Bank Guarantee or FDR or any other form of deposit stipulated by the Corporation.
- iii. Failure of the successful bidder to comply with furnishing the performance guarantee within 30 days as stated above shall constitute sufficient grounds for cancellation of the award of work.
- iv. **Retention Money:** Retention Money shall be deducted at the rate of 6% of the value of work done from Running Bills till the 50% of Security Deposit amount so calculated as above, is built up. Total of Performance Guarantee & Retention Money should not exceed the amount of security deposit calculated as above.
- v. When the retention money reaches the limit of 5 lakhs, the Contractor, if he so desires, may convert the amount into a Bank Guarantees as aforesaid.
- vi. In case a Fixed Deposit Receipt of any bank is furnished by the Contractor to the Corporation as part of the Security Deposit and the bank goes into liquidation or for any other reasons is likely to be unable to make payment against the said Fixed Deposit Receipt, the loss caused thereby shall be borne by the Contractor and the Contractor shall forthwith or on demand furnish additional security to the Corporation to make good the deficit.
- vii. The Corporation may deduct any sum of money payable by the Contractor under the terms of this Contract or any other Contract or any other account whatsoever from his security deposit. In the event of his security deposit amount being reduced by reasons of such deduction as aforesaid, the contractor shall within 10 days of receipt of notice of demand from the Engineer-in-Charge make good the deficit.
- viii. FDR / Bank Guarantee shall be accepted only from Scheduled commercial banks in India.

Section - II	Form of Tender and General rules & Directions for the Guidance of Contractor	Page 3 of 5
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Kudankulam Nuclear Power Project	Construction of 203 Nos of Residential Quarters comprising of 40 Nos of E-type (G+10 floor-1 Tower), 80 Nos of D-Special quarters (G+10 floor-2 Tower), 80 Nos of B-type quarters (G+10 floor-2 Tower) and 3 Nos of F Type quarters (G+1 floor) at Anuvijay Township.
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- ix. No interest will be paid on Security Deposit (Performance Guarantee and Retention Money).

2. Refund of Security Deposit:

- 2.1 The retention money will be refunded to the Contractor after one month from the date of issue of Completion Certificate on receipt of request from the contractor, if as per the Engineer-In-Charge the balance amount of security deposit Performance Guarantee) is sufficient to cover the Liabilities.
- 2.2 After the expiry of the Defects Liability Period, the balance amount of security deposit i.e. the Performance Guarantee shall be refunded by the Engineer-in-Charge to the Contractor. However, if any work remains to be executed under Clause 9 [Defects Liability], the Engineer-in-Charge shall withhold the estimated cost of such rectification work until it is executed.

SHOULD THIS TENDER BE ACCEPTED IN WHOLE OR IN PART, I/WE HEREBY AGREE:

RULE (i)

Should this tender be accepted, in whole or in part, I/We hereby agree to abide and fulfill all terms and provisions of the said conditions annexed hereto and all the terms and provisions contained in the notice inviting tenders so far as applicable, and/or in default thereof to forfeit and pay to Nuclear Power Corporation of India Limited or his successors in office, the sum of money mentioned in the said conditions. A Draft/Bank guarantee of a scheduled commercial bank has been deposited as Bid security.

If I/We fail to furnish the prescribed performance guarantee within prescribed period, I/We agree that the said NPCIL or his successors in office shall without prejudice to any other right or remedy, be at liberty to forfeit the said bid security absolutely. Further, if I/We fail to commence the work specified in the above memorandum, I/We agree that the said NPCIL or his successors in office shall

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Kudankulam Nuclear Power Project	Construction of 203 Nos of Residential Quarters comprising of 40 Nos of E-type (G+10 floor-1 Tower), 80 Nos of D-Special quarters (G+10 floor-2 Tower), 80 Nos of B-type quarters (G+10 floor-2 Tower) and 3 Nos of F Type quarters (G+1 floor) at Anuvijay Township.
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without prejudice to any other right or remedy, be at liberty to forfeit the said bid security absolutely and cancel the award of work.

I/We agree to execute all the works referred to in the tender documents upon the terms and conditions contained or referred to therein and to carryout such deviations as may be ordered, upto maximum of the percentage mentioned in Clause 11.2.1 & 11.2.8 (-75%) of General Conditions of Contract and those in excess of that limit at the rates to be determined in accordance with the provisions contained in General Conditions of Contract. I/We hereby declare that I/We have been debarred/not debarred and/or delisted/not delisted by any Govt./PSU.+

Dated the day of2026

+ Witness *Signature.....

Address

.....

.....

Occupation.....

The above tender is hereby accepted by me for and on behalf of the Nuclear Power Corporation of India Ltd.

Dated the day of 2026

**

* Signature of contractor before submission of tender.

+ Signature of witness to contractor's signature.

** Signature of the Officer by whom accepted.

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SECTION III

SPECIAL INSTRUCTIONS

Kudankulam Nuclear Power Project	Construction of 203 Nos of Residential Quarters comprising of 40 Nos of E-type (G+10 floor-1 Tower), 80 Nos of D-Special quarters (G+10 floor-2 Tower), 80 Nos of B-type quarters (G+10 floor-2 Tower) and 3 Nos of F Type quarters (G+1 floor) at Anuvijay Township.
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Section-III

Special Instructions Special Conditions of Contract

The special instructions/conditions under this section supplement the General Conditions of Contract (G.C.C) Section IV and shall be considered as part of the contract document. Where these “Special Instructions / Special Conditions of Contract” are at variance with the corresponding general conditions, stipulations and specifications elsewhere in the tender document, these “Special Instructions / Special Conditions of Contract” shall prevail.

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Special Instructions Special Conditions of Contract

Part-I

1. PREFERENCE AND EXEMPTIONS TO MSE UNITS (Not Applicable)

AS per NIT clause No. 25

2. LIABILITIES FOR DAMAGE AND INSURANCE:

The Contractor shall provide the following insurance policies in the joint names of the Corporation and the Contractor with insurance cover from the date of commencement of work to the end of the Defects Liability Period. The contractor will be fully responsible for any loss, damage or destruction of NPCIL plant & machineries, property, persons etc. The quoted rate shall include the premium amount for the insurance policies as given in Sch-A Sl. No. 25 and clause 15.1 of GCC. Policies submitted should bear the Work Order (WO) number except Group Insurance for which WO number is not mandatory. Contractor shall submit the copies of Insurance policy along with the original policy document to the Engineer-in-charge before the commencement of work.

2.1 Third Party Insurance:

This policy shall be in the joint name of the Contractor and the Corporation and the period of policy shall be from the date of commencement of work to the end of defect liability period. The contractor shall submit the insurance for third party liability for 10% of Contract value (Including GST) subject to a maximum of Rs. 50 Lakhs to the Engineer-In-Charge before the commencement of work. Wherever CAR Policy is applicable separate third Party Insurance is not required.

2.2 Contractor's All Risk (CAR) Policy:

The Contractor is liable to take Contractor's All Risk (CAR) policy for the whole contract value (Including GST). The insurance amount shall also cover third party liability to the extent, if any as specified in Schedule-A. Though the CAR policy along with third party insurance and workmen compensation policy are essential as per clause no: 15.1.1 of GCC, in case of work costing less than 10 Lakhs for Service & Maintenance contracts, Engineering service contract and Horticultural contracts the CAR policy is not required.

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2.3 ESI Scheme:

~~The contractor shall cover all eligible workers under ESI Act, 1948, even if it is less than ten workmen.~~

~~The contractor shall submit ESI document indicating the names of persons covered under the ESI scheme to the Engineer-in-charge before the commencement of work. In case of any change in number of workmen, covered under the ESI scheme, during the course execution of work, ESI coverage for additional workmen shall be ensured and the change should be intimated to the Engineer-in-Charge.~~

~~The Contractor shall comply with the various provisions of "The Employees State Insurance Act, 1948" as amended from time to time. **ESIC Component as per the provision of ESIC act and its amendments shall be taken into account while quoting the rate wherever applicable.**~~

~~Overtime allowance will be considered as part of wage for the purpose of working out the contribution only and will not be considered for the purpose of the coverage of the employee under the scheme. Bonus, if paid at regular intervals not exceeding two months shall be considered as Wage Component for payment of ESI Contribution.~~

~~The wage limit for coverage of an employee under the Act shall be Twenty One Thousand rupees a month. An employee whose wages exceed Rs.21,000/- per month at any time after and not before the beginning of the contribution period, shall continue to be an employee until the end of that period.~~

~~The Contractor is liable to pay the contribution in respect of eligible worker at the specified rates to the ESI Corporation within 15 days of the last day of the Calendar month in which the contributions fall due.~~

~~Contractor should have valid registration with ESIC and shall arrange to deposit ESI Contributions etc. as applicable in respect of eligible employees/workmen deployed for execution of this work in shall be submitted by the Contractor to Engineer-in-Charge every month. The contractor shall ensure the compliance of the ESIC Act, 1948/rule thereof and provide necessary support to all his employees/workmen for availing ESI benefits.~~

~~The contractor shall also indemnify, on stamp paper of appropriate value, before settlement of final bills that provisions of ESI Act, 1948 as applicable have been complied with and he shall~~

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~~stand responsible for any future claims, in this regard, received through Central and/or State Government. **Employee / workman compensation policy is not required, where the provision of the ESI Act 1948 is applicable.**~~

2.4 Employees Compensation Policy:

The contractors shall take the Employee's Compensation Policy for employees who are engaged in this work and not covered under the ESI act.

2.5 Group Insurance:

In case the employees engaged on this work are already covered under the Group Insurance policy of the Contractor, same shall be acceptable in lieu of employee compensation policy. In such case the proof of employment shall be submitted.

3. BONUS:

The monthly bonus @ 8.33% payable at monthly minimum wages of Rs.7000/- for employee drawing less than monthly minimum wages of Rs.7000/-. In case monthly wages exceeds ₹ 7000/- bonus @ 8.33% shall be payable at actual monthly minimum wages subject to upper wage threshold limit of Rs.21000/- per month.

4. EPF:

- a) Statutory levies like EPF @ 13.00% (of minimum wages as per Scheduled of employment of respective category subject to maximum ceiling of Rs.15000/month, or any other rate / ceiling made applicable by law during the currency of the contract, shall be paid. Along with first RA Bill the Contractor shall submit the copy
- b) Contractor shall submit the total list of workers deployed for the contract with details of EPF Universal account number (UAN) along with Electronic Challan cum Return (ECR) copy with each bill. The Contractor shall submit a consolidated undertaking regarding PMRPY as per the Performa enclosed as Annexure - E along with each Bill.
- c) After completion of the contract, while submitting the security deposit refund request, the Contractor shall submit an undertaking regarding PMRPY as per Performa enclosed as Annexure - F.

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- d) **Contractor should mandatorily have EPF registration irrespective of number of workers to be deployed / engaged by him.** The Contractor shall ensure PF coverage to all his workers (Whether more OR less than 20). The Contractor shall comply with all the existing provisions amendments in the said Act / Scheme from time to time.
- e) The Contractor must open the EPF Accounts in respect of all his workers / employees covered under the EPF and MP Act- 1952. The Contractor should maintain record of EPF amount deposited in the respective EPF accounts of all their workers / employees.
- f) The contractor is liable for the EPF contribution / dues for the employees / workers deployed the contractor for the work and indemnify NPCIL of any future liabilities on this account. The contractor shall indemnify on the Non-judicial stamp paper of value Rs. 200/- duly attested by Notary as per enclosed format(Annexure –C) before settlement of final bill for the compliance of EPF & MP Act, 1952 & ~~the ESI Act, 1948~~ as applicable and submit it to the Engineer-In-Charge. the contractor will also stand responsible for any such future claims with regard to EPF dues / outstanding received through concerned authorities.

5. Industrial safety & Security:

For safety requirement, the Contractor shall provide PPEs / safety gears, Uniforms (Reflective jacket for construction projects), safety shoes confirming to IS 15298. The Contractor shall also submit medical certificate, Police Verification Certificate for all employees.

6. Charges of **Audiometry / medical** test are to be included to the account of Contractor while calculating the daily wage of manpower.

7. UNIFORM CLOTHING:

- a) Contractor shall provide to each of his workers deployed for the work having completion period more than 3 months and up to 12 months, two sets of uniform. Additional one set of uniform shall be provided by the contractor for every additional period up to 6 months beyond one year of completion period. A set of uniform shall comprise of one formal Shirt, one trousers and one pair of socks. The uniform color is light brown shirt & dark brown pant for Gents, Light brown Sari/dark brown suit with light brown checkered shirts for ladies. In Transport Contracts, the uniform color code shall be as per motor vehicle act/rules. The uniform shall be other than NPCIL Employees uniform. Name of the C front left pocket of all shirts. This clause shall be applicable to all Annual Maintenance & service contracts for a period more than three months.

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- b) Employees of PSU/Central Govt. / State Govt. or Private Companies can use their own company issued uniform for regular employees.

8. SAFETY SHOES:

- a) Safety shoe conforming to relevant Indian Standards (IS 15298, CE and EN ISO 20345) shall be provided by the Contractor to all workers except for works of horticulture and outdoor housekeeping works during rainy season, for which the contractor may be allowed to provide all weather shoes with the approval of Engineer-in-Charge (Works) in place of safety shoes.
- b) A record of uniform and shoe distribution signed by the Contractor and each of his workers shall be handed over to the Engineer-in- Charge.

9. LABOUR PAYMENT:

- a) The Contractor shall make the payment of minimum wages and other allowances to all its workers on or before 7thday of succeeding month. **If contractor fails to make payment of wages and other allowances to the workers on or before 7thday of the succeeding month, penalty as per applicable Clause will be imposed.** In case it is established that the Contractor employee is not being paid the wages plus allowances as required in this tender, penal action may be initiated as per Contract provisions. Contractor will arrange muster roll of all Contractor employees which will be countersigned by the contract supervisor deputed for the jobs. He will submit the roll to Engineer-in- Charge for record and verification of wage at the end of each month.
- b) **Mode of Payment:** Contractor shall make payment to his workers on monthly basis through bank only. Payment of monthly wages shall be made in single installment and part payment is not allowed. For this purpose, the Contractor shall ensure that all the workers are having their individual bank account. copy of wage Slip (**Annexure-B**) duly signed by worker and the Contractor shall be submitted to Engineer-in-charge along with each RA bill and final bill. If the Contractor fails to make payment as per the terms and condition of the WO, action will be initiated as deemed fit.
- c) Levy of penalty if any on the Contractor does not abrogate him from his responsibility for disbursement of wages as per the payment of wage act. NPCIL shall not be liable for any damage or compensation payable for any lapse on part of the Contractor.

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10. NATIONAL HOLIDAYS:

Contractor shall consider National holidays {Republic Day (26th January), Independence Day (August 15), Gandhi Jayanthi (October 2)} as paid holidays for his workers while quoting. Any holiday declared on the date of Poll under Section 135B of the Representation of People Act, 1951, shall also be considered as paid holidays.

11. AGREEMENT:

The successful bidder shall enter into contract and shall execute and sign the Contract agreement in accordance with the Articles of Agreement. The Successful bidder shall obtain appropriate value Bond paper/ Stamp paper (top page) (as per applicable stamp duty Act at work location) at his own cost in the joint name of NPCIL and the Contractor.

12. COMPLIANCE WITH INDUSTRIAL SAFETY GUIDELINES:

To avoid any accidents with staff and/or labour employed during execution of work, it is imperative to observe the safety code provisions specified under clause 5.6 of Section-IV - General Conditions of Contract, AERB safety guide and Site Instruction for Industrial Safety (Appended with the Section-III) and these shall be strictly followed. The cost of such safety measures shall be included by the bidder in his rates quoted for various items in the schedule of quantities and rates.

13. ~~WORKING IN RADIATION ZONES:~~

- ~~a) The contractor shall submit the previous dose history of the employees who they proposed to be engaged in radioactive area of NPCIL sites in the form of discharge certificate issued by the appropriate authorities of the Nuclear Power Station where they were employed last as a radiation worker.~~
- ~~b) If any of the employees had not worked in radioactive areas prior to deployment in NPCIL sites, the contractor has to submit an undertaking to this effect to Engineer-in-Charge. If any of the information submitted by the Contractor was observed to be incorrect, penalty as per relevant clause shall be levied.~~
- ~~c) Contractor shall ensure that all the workers are trained /retrained and qualified enough to understand the radiation signs, radiation symbols and boards and to understand the basic knowledge of radiation protection. Radiation protection training shall be given by NPCIL sites.~~

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~~They shall also undergo refresher training on radiation protection once in a year and as & when advised by Engineer in charge.~~

- ~~d) They must follow all radiation protection practices and instruction from Health Physics Unit of NPCIL. Violation of any instruction regarding radiation protection shall be viewed seriously and the violation of the procedure shall invoke the levy of penalty as per relevant clause.~~
- ~~e) All the Contractor workers should work under the guidance of ARPT qualified departmental representative (Green qualified) in radiation areas.~~
- ~~f) For the purpose of issue of TLD, the Contractor shall submit Medical fitness certificate in the format provided by Engineer in charge, Two Passport size photograph of each worker deployed under this Contract along with duly filled TLD application form to the Engineer in charge at the start of work. Any false information provided in the TLD application form will be seen seriously and punitive action as deemed fit will be taken by NPCIL. Validity of medical fitness certificate is one year. Before the expiry date of medical certificate, the Contractor shall submit the new medical fitness certificate in prescribed form.~~
- ~~g) An application for re-newel of TLD for radiation workers shall be submitted to Health physics Unit in prescribed format in the last week of previous month.~~
- ~~h) All the radiation workers engaged by the Contractor shall undergo Pre-job Whole Body Counting (WBC) and annual whole body counting at given time and place intimated by the Engineer in charge. He shall also undergo whole body counting after the termination of the Contract (post-job whole body counting). In addition to above a particular radiation worker may be asked to undergo whole body counting based on the NPCIL sites requirements.~~
- ~~i) The Contractor shall ensure that whole body counting requirements as specified above are fulfilled. Engineer in charge reserves the right to withhold the final bill till completion of annual whole body counting, post-job whole body counting and any other whole body counting as required by Engineer in Charge during the currency of the Contract.~~

14. ENVIRONMENTAL PROTECTION MEASURES:

All the vendors/contractors shall comply with the provisions enumerated below:

- a. All the resources should be used optimally. Major thrust should be given to comply with conservation of energy and resources.

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- b. All the persons should be conversant with good work practices, Industrial hygiene and try to incorporate in daily activities.
- c. Use of compressed gas or hazardous materials should be with permission of Engineer-in-charge.
- d. Comply with segregation of waste at source in to biodegradable, non-biodegradable and hazardous materials. This segregated waste should be disposed off as per the approved procedure of the station.
- e. Continuous evaluation of environmental aspect should be done to prevent/minimize the environmental adverse impact.
- f. Contingency and Mitigating measures should be in place to combat any degradation in environmental, occupational health and safety measures.

15. FOREIGN MATERIAL EXCLUSION:

- a. The contractor shall ensure that all his workmen follow the principles of foreign material exclusion practices. All the equipment/piping openings shall be closed with temporary covers during the progress of work.
- b. It should be ensured that all the loose articles / items are deposited at a designated place, while entering into the area of opened equipment and systems such as pipelines, turbine & generator etc.,

16. DOCUMENTS TO BE SUBMITTED AT DIFFERENT STAGES OF WORK EXECUTION:

A) Before commencement of work:

The Contractor shall submit following documents to Engineer-in- Charge before commencements of work.

- a. Work order / LOI / Contract Order / Sanction Order acceptance letter.
- b. (Form-III) for getting a Labour license, if applicable.
- c. For the Contracts covered under BOCW Act and BOCW Cess Act, the contractor must get themselves registered under the Act. The copy of registration along with the Challan of Cess paid shall be submitted to Engineer-in- Charge.
- d. Original Insurance Policies along with premium receipts

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- i. Contractor's All Risk Insurance policy for the whole contract value (Including GST) including insurance for Third Party Liability for 10% of the contract value as per the applicability.
- ii. ~~ESI document indicating the names of persons covered under the ESI scheme OR Workmen Compensation Policy OR both as per the applicability.~~
- e. Performance guarantee as per clause 4.2.3 of General Conditions of Contract.

B) For payment of the RA Bill,

The contractor shall submit the following documents along with first RA bill to EIC.

- a. Labour license wherever applicable (along with first RA Bill only).
- b. GST registration Copy as per GST Act (along with first RA Bill only)
- c. Declaration form for GST (Annexure-H of Section –III)
- d. Proof of previous month GST remittance.
- e. Copy of registration of EPF for firm along with the Universal EPFO account number (UAN) of all the employees, which shall be linked to KYC details such as Aadhaar number, Mobile number and bank account number (along with first RA Bill only).
- f. Partnership deed of firm in case of partnership firm or power of attorney of the representative in case of company (along with first RA Bill only).
- g. Bank account details of the contractor for payment (along with first RA Bill only).
- h. Copy of PAN card (along with first RA Bill only).
- i. Record of uniform distribution duly signed by the Contractor and each of his workers. Proforma is enclosed as Annexure-D
- j. Copy of wage register witnessed by NPCIL representative for the bill period and bank transfer details.
- k. Monthly wage certificate issued by HR.
- l. Documentary proof of previous month EPF deposition showing statement for each UAN.
- ~~m. Copy of ESIC registration details.~~
- n. Tax invoice/e-invoice or undertaking of e-invoice in triplicate.
- ~~o. Documentary proof of previous month ESI deposition including employee wise details of remittance, if applicable.~~
- p. Proof of previous month BOCW Cess remittance if applicable.
- q. Signed Annexure-E for Pradhan Mantri Rojgar Protsahan Yojana (PMRPY) Scheme undertaking (PMRPY) Scheme undertaking if applicable (along with first RA Bill.)

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C) For payment of the Final Bill:

The following documents shall be submitted in addition to those required for RA bills:

- a. No claim declaration by the Contractor
- b. Indemnification by the Contractor regarding compliance of EPF & MP Act, 1952
- c. No dues certificates if any.
- d. Signed Annexure- E for PMRPY Scheme undertaking.
- e. Indemnification by the Contractor regarding compliance of BOCW Act, 1996, if applicable.
- f. Wages certificate from HR section up to actual date of completion.

D) Compliances by the bidders on statutory requirement:

a. RA Bill / Final Bill:

The Contractor will be continuously monitored and Running Account Bills/ Final Bill of the Contractor will be withheld if they fail to comply with statutory provisions as mentioned in the General Conditions of Contract or any other contract document.

b. Release of PBG / SD:

Release of PBG & SD will be after the satisfactory completion of the Contract including all statutory compliances as certified by the Engineer-in-Charge.

17. CONTRACTOR'S FUNCTION AND ORGANISATION:

Contractor shall function as an organization and arrange various categories of Manpower & other resources for the duration of the work to maintain the progress of work in accordance with the requirement of completion schedule of work.

- a. The Contractor or his authorized representative should be available at site & should preferably reside in nearby area of the site. Further the Contractor should have or provide communication facility like (Telephone, Mobile phone, E-mail etc.,) as necessary, to his authorized representative and the details of the same shall be communicated in writing to the Engineer-in-Charge of work for day to day interaction regarding planning & progress of the work under the Contract.
- b. The Contractor shall not withdraw any of his personnel from the work without due notice to Engineer-in-Charge.

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- c. As far as possible, the Contractor shall use locally available resources namely materials, equipment and workmen. The Contractor shall employ workmen preferably from amongst the
- d. The Contractor shall provide all reasonable facilities such as tools, personnel etc. and ensure coordination with Engineer-in-charge or his authorized representative to enable them for carrying out supervision & measurements checks etc. in a satisfactory manner.
- e. The Contractor should take all preventive measures and comply with the guidelines notified by NPCIL site, from time to time, to contain the spread of diseases in epidemic and pandemic scenarios.

18. GROUNDS FOR BANNING:

Details are covered in NIT.

19. VULNERABILITY ATLAS OF INDIA

Clause: Planning and Designing in purview of Vulnerability Atlas of India Vulnerability Atlas of India (VAI) is a comprehensive document which provides existing hazard scenario for the entire country and presents the digitized State/UT wise hazard, maps with respect to earthquakes, winds and floods for district-wise identification of vulnerable areas. It also includes additional digitized maps for thunderstorms, cyclones and landslides. The main purpose of this Atlas is its use for disaster preparedness and mitigation at policy planning and project formulation stage.

This Atlas is one of its kind single point source for the various stakeholders including policy makers, administrators, municipal commissioners, urban managers, engineers, architects, planners, public etc., to ascertain proneness of any city/ location/site to multi-hazard which includes earthquakes, winds, floods thunderstorms, cyclones and landslides. While project formulation, approvals and implementation of various urban housing, buildings and infrastructures schemes, this Atlas provides necessary information for risk analysis and hazard assessment.

The Vulnerability Atlas of India has been prepared by Building Materials and Technology Promotion Council under Ministry of Housing and Urban Affairs, Government of India and available at their website . It is mandatory for the bidders to refer Vulnerability Atlas of India for multi-hazard risk assessment and include the relevant hazard proneness specific to project location while planning and designing the project in terms of:

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- i. Seismic zone (II to V) for earthquakes,
- ii. Wind velocity (Basic Wind Velocity: 55, 50, 47, 44, 39 & 33 m/s)
- iii. Area liable to floods and Probable max. surge height
- iv. Thunderstorms history
- v. Number of cyclonic storms/ severe cyclonic storms and max sustained wind specific to coastal region
- vi. Landslides incidences with Annual rainfall normal
- vii. District wise Probable Max. Precipitation

20. SUMMARY OF PENALTIES:

Penalty provisions:

Categorisation of types of penalties imposed is summarized into 4 categories:

- ~~1) Category I: Penalty on violation of Radiation Protection Procedure/Provisions (Not Applicable)~~
- 2) Category II: Penalty on violation of Industrial Safety Provisions
- ~~3) Category III: Penalty on Non-Availability of Requisite Manpower~~
- 4) Category IV: Penalty on General Violation

Kudankulam Nuclear Power Project	Construction of 203 Nos of Residential Quarters comprising of 40 Nos of E-type (G+10 floor-1 Tower), 80 Nos of D-Special quarters (G+10 floor-2 Tower), 80 Nos of B-type quarters (G+10 floor-2 Tower) and 3 Nos of F Type quarters (G+1 floor) at Anuvijay Township.
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1) Category I: Penalty on violation of Radiation Protection Procedure/Provisions: (Not Applicable)

2) Category II: Penalty on violation of Industrial Safety Provisions:

S. No.	Description of Violation	Multiplication Factor	Base Value
1)	<p>a) Worker found without safety induction training or refresher training/ Worker found without safety training card;</p> <p>b) General non-compliance of Pre-job Briefing/ non-availability of JHA/ Safety Work Permit or Safe Working Procedure for high risk/hazardous jobs such as working in confined space, working on high voltage electrical equipment, work at height above 2.5 meter, heavy material handling/transportation etc;</p> <p>c) Not providing required PPEs/Tools to the workmen or not using PPEs/Tools or using PPEs/Tools in incorrect manner or using defective PPEs/Tools;</p> <p>d) Workers working at height without height pass;</p> <p>e) Non-compliance of Safe movement of manpower as per rule and regulation applicable at the site such as not using pedestrian pathway during commuting from one location to another etc;</p> <p>f) Non-compliance to uniform/ helmet/ shoes</p> <p>g) If any contractor's person found smoking or using Gutka/ Tambaku /Alcohol inside main plant area;</p> <p>h) Unsafe Condition of Electrical Connection taken for the operation of Electrical tools/tackles without three pin plug or use of damaged cable of Electrical</p>	Rs 2000/- per Occasion	

Kudankulam Nuclear Power Project	Construction of 203 Nos of Residential Quarters comprising of 40 Nos of E-type (G+10 floor-1 Tower), 80 Nos of D-Special quarters (G+10 floor-2 Tower), 80 Nos of B-type quarters (G+10 floor-2 Tower) and 3 Nos of F Type quarters (G+1 floor) at Anuvijay Township.
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S. No.	Description of Violation	Multiplication Factor	Base Value
	tools/tackles; i) Not ensuring good housekeeping during job execution as well as post job completion; j) Unsafe handling of heavy material or operation of material handling equipment such as crane/forklift without authorization;		
	k) Working on high voltage electrical equipment without electrical authorization	Rs 5000/-	
2)	In case of fatal accident or accidents which result in permanent total disability/major injuries to any worker of the contractor	<p>If the contractor does not take Safety precautions and/or fails to comply with the Safety Rules prescribed by NPCIL or under the applicable law for the safety of equipment and plant and for the safety of personnel and the contractor does not prevent hazardous condition which cause injury to his own employees or employees of other contractors, or NPCIL employees or any other person who are at site or adjacent thereto, the contractor shall be responsible for payment of compensation to NPCIL as per the following schedule:</p> <p>a. Fatal injury or accident-causing death: Compensation @ two percent (2%) of Contract value or Rs. 10,00,000, whichever is lower, per person. Moreover, if compensation calculated as above is less than ₹ 2,00,000, then</p>	

Kudankulam Nuclear Power Project	Construction of 203 Nos of Residential Quarters comprising of 40 Nos of E-type (G+10 floor-1 Tower), 80 Nos of D-Special quarters (G+10 floor-2 Tower), 80 Nos of B-type quarters (G+10 floor-2 Tower) and 3 Nos of F Type quarters (G+1 floor) at Anuvijay Township.
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S. No.	Description of Violation	Multiplication Factor	Base Value
		<p>compensation will be @ ₹ 2,00,000 per person.</p> <p>b. Major injuries or accident causing 25% or more permanent disablement to work men or employees:</p> <p>Compensation @ one half of one percent (1/2%) of Contract value or ₹2,00,000, whichever is lower, per person.</p> <p>Moreover, if compensation calculated as above is less than Rs 50,000, then compensation will be @ Rs 50,000 per person.</p> <p>Note: These compensations are applicable for death/injury to any person whatsoever. Permanent disablement shall have the same meaning as indicated in Workmen Compensation Act. The compensation mentioned above shall be in addition to the compensation payable to the workmen/employees under the relevant provisions of Workmen's Compensation Act and rules framed there under or any other applicable laws and statutory provisions as applicable from time to time. In case the Owner is made to pay such compensation then the Contractor is</p>	

Kudankulam Nuclear Power Project	Construction of 203 Nos of Residential Quarters comprising of 40 Nos of E-type (G+10 floor-1 Tower), 80 Nos of D-Special quarters (G+10 floor-2 Tower), 80 Nos of B-type quarters (G+10 floor-2 Tower) and 3 Nos of F Type quarters (G+1 floor) at Anuvijay Township.
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S. No.	Description of Violation	Multiplication Factor	Base Value
		liable to reimburse the Owner such amount in addition to the penalty/compensation indicated above.	
3)	In case of violation/Non-compliance of any other industrial safety related requirements/rules/regulations/guidelines or in case of Safety Related Deficiency(SDRs)	Rs 5000/-	

3) Category III: Penalty on Non-Availability of Requisite Manpower: (Not Applicable)

4) Category IV: Penalty on General Violation:

S. No.	Description of Violation	Multiplication Factor	Base Value
1	Delay in payment of minimum wages to workmen / worker/ contractor's employee	0.1	Daily Minimum wages corresponding to particular category of worker and schedule of Employment of Central or State Govt (whichever is higher) per day per person
2	a) Delay in submission of insurance policies as per tender condition; b) Delay in Renewal of insurance policies as per tender condition (if required)	2	Premium required to be paid for the lapse period on pro rata basis
3	a) Late/delay in submission of PG (Performance Guarantee) b) Delay in Renewal of PG	0.1% (per day)	Amount of money to be submitted as Performance guarantee for the lapse/

Kudankulam Nuclear Power Project	Construction of 203 Nos of Residential Quarters comprising of 40 Nos of E-type (G+10 floor-1 Tower), 80 Nos of D-Special quarters (G+10 floor-2 Tower), 80 Nos of B-type quarters (G+10 floor-2 Tower) and 3 Nos of F Type quarters (G+1 floor) at Anuvijay Township.
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S. No.	Description of Violation	Multiplication Factor	Base Value
	(Performance Guarantee) (if required)		delay period on pro rata basis
4	If t Contractor person found traveling in departmental transport without proper pass /authorization	0.1	Daily Minimum wages corresponding to particular category of worker and schedule of Employment of Central or State Govt (whichever is higher) per violation/incident
5	In case of loss or damage of RFID/ID card by any of Contractor's person/Non return of RFID/ID Card	1.1	Actual cost of new RFID/ID Card per violation/incident
6	Any other general violation/ violation specific to particular nature of work as described in Tender document	0.1	Daily Minimum wages corresponding to particular category of worker and schedule of Employment of Central or State Govt (whichever is higher) per violation/incident

Notes:

1) Quantum of Penalty to be imposed = Base Value * Multiplication Factor

where,

Base Value (as specified in above mentioned tables) varies with particular category of worker (viz. Unskilled, Semi-Skilled, Skilled, Highly Skilled), Schedule of Employment and place or as specified above mentioned tables under Base Value Column.

Multiplication Factor (as specified in above mentioned tables) varies with type of violation.

Kudankulam Nuclear Power Project	Construction of 203 Nos of Residential Quarters comprising of 40 Nos of E-type (G+10 floor-1 Tower), 80 Nos of D-Special quarters (G+10 floor-2 Tower), 80 Nos of B-type quarters (G+10 floor-2 Tower) and 3 Nos of F Type quarters (G+1 floor) at Anuvijay Township.
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2) Cost of Deployment of Supervisor is included in Overhead part of contractor's total (i.e., 15 %) Profit+ Overhead portion included in estimation.

For calculation of penalty, Category of Supervisor is taken as highly skilled and Category of Contractor's Engineer/Safety Officer is taken as 1.5 times the highly skilled.

3) In case it is not feasible to assign particular category of worker for any contract conditions violation for calculation of base value, then category and schedule of employment corresponding to Contractor's Supervisor may be used as default category of worker (i.e Highly skilled category) and also, in case it is also not feasible to assign particular Schedule of Employment for calculation of base value, then Scheduled Employment of Construction or maintenance of Roads.....may be used as default schedule of employment..

Deployment in Contractor's Supervisor provisions:

Contractor has to deploy contractor's supervisor as per GCC Clause no. 5.7. at own cost.

Penalty for Non-deployment of minimum number of supervisor/ absence of supervisor(s): 1.25 times daily minimum wages corresponding to highly skilled category of worker and schedule of Employment of Central or State Govt (whichever is higher)per violation/incident/person"

Kudankulam Nuclear Power Project	Construction of 203 Nos of Residential Quarters comprising of 40 Nos of E-type (G+10 floor-1 Tower), 80 Nos of D-Special quarters (G+10 floor-2 Tower), 80 Nos of B-type quarters (G+10 floor-2 Tower) and 3 Nos of F Type quarters (G+1 floor) at Anuvijay Township.
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Special Instructions Special Conditions of Contract

Part-II

GENERAL

The special instructions/conditions under this section supplement the General Conditions of Contract (G.C.C) Section IV and shall be considered as part of the contract document. Where these special instructions are at variance with the corresponding general conditions, stipulations and specifications elsewhere in the tender document, these special instructions/conditions shall prevail.

1. GENERAL INFORMATION TO THE BIDDERS:

1.1 PROJECT:

The Kudankulam Nuclear Power Project comprises of 2x1000Mwe operating units and 4x1000Mwe construction units.

1.2 LOCATION:

Kudankulam Nuclear Power Project is located along the coast of Gulf of Mannar, 25 kms north-east of Kanyakumari, in Radhapuram Taluk, Tirunelveli-District in Tamilnadu.

1.3 ACCESS:

Kudankulam Nuclear Power Project is accessible from NH-07 which passes through Anjugramam village. Further it can be accessed from Anjugramam to Tiruchendhur road.

1.4 METEOROLOGICAL DATA:

The Meteorological data of the area is as Follows.

Parameters	Maximum	Minimum	Average
Temperature (°C)	41	20.2	28.4
Rainfall in mm	1435.2	212.8	775
Relative Humidity in %	100	23	75
Wind speed at 10 meter height in m/s	15	< 1	3.5

1.5 SITE INSPECTION

The bidder should visit the site and familiarize themselves thoroughly with the site conditions before submitting their bids. Non familiarity with site conditions will not be considered a reason

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Kudankulam Nuclear Power Project	Construction of 203 Nos of Residential Quarters comprising of 40 Nos of E-type (G+10 floor-1 Tower), 80 Nos of D-Special quarters (G+10 floor-2 Tower), 80 Nos of B-type quarters (G+10 floor-2 Tower) and 3 Nos of F Type quarters (G+1 floor) at Anuvijay Township.
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either for extra claims or for not carrying out the work in strict conformity with drawings and Technical specifications as specified / mentioned in the tender document. For any information on site visit, the bidder may contact the office of Engineer- in- charge (CTC) with prior intimation.

2. SPECIAL CONDITIONS OF THE CONTRACT:

2.1 CONTRACT SCHEDULE:

The bidder shall note that the entire work has to be completed within the stipulated time of contract. The time allowed for carrying out the work as entered in the tender shall be strictly observed by the contractor and shall deemed to be the essence of the contract. All work shall be completed in accordance with the approved time schedule which forms a part of the contract.

The contract period includes Sundays and Holidays and rainy season / days, if any.

2.2 WORKS CO-ORDINATION:

The contractor shall note that several other agencies may also be simultaneously working within and around the work site and structures covered under present contract. Such works to be carried out without any hindrance and fully co-ordinate his activities and extend all his co-operation to the other agencies working therein. In case of dispute in such co-ordination, the Decision of Engineer-in-charge shall be final and binding on the contractor.

2.3 SECURITY:

The contractor shall follow security rules as per GCC Clause No. 4.20 and site security guidelines prevailing from time to time. The contractor shall get the identity cards of their workers issued from Security section at Anuvijay township / KK-3 to 6 site / CISF as applicable from time to time. Contractor shall submit the duly filled up forms of all workers to be deployed through Engineer- in-Charge to CISF (for works in KK-1&2 plant site) or Security agency designated by NPCIL (for works in KK-3 to 6 / Anuvijay Township) as the case may be for issue of identity card to their workers. The workers should display their Identity Cards during the working time. Xerox copy of identity cards of all workers to be submitted to Engineer-in-Charge. It shall be noted that the CISF/security section is empowered to carry out the checks.

On receipt of LOI / work order the contractor shall arrange to apply for the police verification for the workers proposed to be deployed for the work at the earliest but before start of work.

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The following documents are required to be produced along with the application form for the gate entry pass:

- a) Copy of LOI / WO.
- b) Aadhaar Card of the individual.
- c) Qualification Certificate where ever applicable.
- d) Copy of Police Verification Certificate (PVC) / Proof of Submitting PVC Challan / application.
- e) Residential proof.

Note:

It may please be noted that contract workers are required to have police verification certificate (PVC), first entry into plant site may be permitted on submission of PVC challan. However, the PVC shall be submitted at the earliest.

On completion of work, contractor has to surrender all identity cards issued under this contract to their labour / staff to CISF or security section as applicable. No dues certificate has to be submitted to Engineer-in- Charge of work before final bill from respective security agencies.

No due certificate has to be obtained from CISF pass section OR Time office for returning the RFID Cards (Identity cards at Township) issued to contractor workers before clearing the final bill. The RFID Cards are to be handed over to pass section at main gate if any employee is leaving the job OR once the validity period is completed OR completion of the contract period whichever is earlier. In case of loss / non-returning of RFID Cards a penalty as per clause No. 19 shall be imposed.

2.4 TEMPORARY APPROACH ROADS:

The contractor shall construct and maintain at his own cost, the temporary access roads and approaches to the work site, offices, workshop etc.

The contractor may use the roads formed by the Corporation in the vicinity of the works for transport of equipment and materials.

All roads at the work site including any road formed by the contractor will be used by the project, other contractors and agencies at site and the contractor is not entitled for any payment as compensation on this account.

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Kudankulam Nuclear Power Project	Construction of 203 Nos of Residential Quarters comprising of 40 Nos of E-type (G+10 floor-1 Tower), 80 Nos of D-Special quarters (G+10 floor-2 Tower), 80 Nos of B-type quarters (G+10 floor-2 Tower) and 3 Nos of F Type quarters (G+1 floor) at Anuvijay Township.
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Contractor shall clean the spillover concrete and the other materials over the roads used by them regularly. However, at the end of their work, the damage(s) if any to the road formed by NPCIL shall be made good at their own cost to the satisfaction of the Engineer.

3. FACTORS TO BE CONSIDERED FOR ARRIVING AT DAILY WAGES WHILE QUOTING:

Bidder while quoting their rates shall take into account all the components of manpower cost mentioned hereunder and all his profit and overhead including the costs to be incurred on insurance, supervision, PPE, uniform & shoe, labour license, police verification, audiometry & medical test, ~~ESI Contribution~~, PF and Bonus and allowances etc. as applicable for this work. Corporation will not reimburse him separately for any such expenses.

3.1 MINIMUM WAGES:

The minimum wages shall be as per applicable Scheduled Employment of respective category of manpower.

The contractor shall pay not less than the minimum wages declared from time to time by Central or State Government; whichever is higher and other allowance as specified in clause 3.3. Any increases (Increase / Decrease) in the wages notified by statutory authority of the Central / State Government whichever is higher during the currency of the contract and during any valid period of extension of contract shall also to be paid by the contractor to the workers. Categorization of contract employees shall be as per SOQR / Section-V. The minimum wage rate is generally revised twice every year and comes into effect on 1stApril and 1stOctober. Contractor shall quote his rates considering the possible wage revisions.

Minimum daily wage applicable, as on the date of publishing the tender, for KKNPP site for different categories of workers are summarized as below, only for information. Contractor shall keep himself / herself updated, once the rates are notified by Central / State Government from time to time and ensure its compliance for any increase in wages during currency of contract.

This information is provided only to facilitate submission of the bid. It is the responsibility of the bidder to find out latest applicable wages while submitting the bid or during the currency of contract. Any request for reimbursement of difference in applicable wages as declared by the statutory authority (Central or State Govt whichever is higher) and the below indicated wages will not be entertained at any stage of the contract period or extended period of contract.

Kudankulam Nuclear Power Project	Construction of 203 Nos of Residential Quarters comprising of 40 Nos of E-type (G+10 floor-1 Tower), 80 Nos of D-Special quarters (G+10 floor-2 Tower), 80 Nos of B-type quarters (G+10 floor-2 Tower) and 3 Nos of F Type quarters (G+1 floor) at Anuvijay Township.
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A. Housekeeping at Plant and Colony: As per scheduled employment of “Sweeping & Cleaning etc.”

Category of manpower	Present wage rate in (₹) (w.e.f. 01-04-2024)
Unskilled	522.00

B. Watch and Ward Staff: As per scheduled employment of “Watch and Ward”- Zone C

Category of manpower	Present wage rate in (₹)(w.e.f. 01.-04.2024)
Without Arms(Skilled)	734.00
With Arms (Highly Skilled)	862.00

C. Gardening and Horticulture: As per scheduled employment of “Agriculture”

Category of manpower	Present wage rate in (₹)(w.e.f. 01-04-2024)
Unskilled	488.80
Semi-skilled / unskilled supervisory	561.80

D. Loading and Unloading: As per scheduled employment of “Loading and Unloading”

Category of manpower	Present wage rate in (₹) (w.e.f. 01-04-2024)
Unskilled	522.00

E. All other types of works: As per scheduled employment of Construction or maintenance of roads, runways in building operations including laying down underground electric wireless, radio, television, telephone, telegraph and overseas communication cables and similar other underground cabling work, electric lines, water supply lines and sewage pipelines.

Category of manpower	Present wage rate (w.e.f. 01-04-2026) in (₹)
Unskilled	926.30
Semi-skilled / unskilled supervisory	1038.30
Skilled / Clerical	1088.30
Highly skilled	1119.30

Kudankulam Nuclear Power Project	Construction of 203 Nos of Residential Quarters comprising of 40 Nos of E-type (G+10 floor-1 Tower), 80 Nos of D-Special quarters (G+10 floor-2 Tower), 80 Nos of B-type quarters (G+10 floor-2 Tower) and 3 Nos of F Type quarters (G+1 floor) at Anuvijay Township.
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3.2 CONTRACTOR'S PROFIT AND OVER HEADS (CP & OH)

Departmental estimate put to tender includes CPOH@ 15%

3.3 SPECIAL AND TRANSPORT ALLOWANCE:

~~Following fixed special allowance and transport allowance as per the table below shall be payable by contractor to his employees for the following works,~~

- ~~1. Works and Service cum maintenance contracts at KKNPP-1&2 & AVTS.~~
- ~~2. Service cum maintenance contracts at KKNPP - 3 to 6.~~

Special allowance and transport allowance are not applicable for contracts of watch and ward, all CSR works and all mega package contract of KK – 3 to 6.

	Schedule of Employment	Category of manpower	Special Allowance per day (₹)	Transport allowance per day (₹)
4	Sweeping and cleaning- Housekeeping works	Unskilled	118.35	28.40
2	Agriculture- Gardening and Horticulture works	Unskilled category	118.35	28.40
3	Agriculture- Gardening and Horticulture works	Semi-skilled / unskilled supervisory	136.60	32.78
4	Loading and Unloading Works	Unskilled	118.35	28.40
5	Construction or Maintenance of Roads, Runways, or in Building, Operations- All other types of works.	1) Unskilled	118.35	28.40
		2) Semi-Skilled/ unskilled supervisory	136.60	32.78
		3) Skilled / Clerical	144.73	34.73
		4) Highly Skilled	149.73	35.93

~~If transport facility through company owned or hired vehicles, is provided to the employees by the contractor, transport allowance may not be paid, in such cases proof of the transport arrangement such as copy of RC and vehicle entry pass plant site are to be submitted to ENC.~~

Kudankulam Nuclear Power Project	Construction of 203 Nos of Residential Quarters comprising of 40 Nos of E-type (G+10 floor-1 Tower), 80 Nos of D-Special quarters (G+10 floor-2 Tower), 80 Nos of B-type quarters (G+10 floor-2 Tower) and 3 Nos of F Type quarters (G+1 floor) at Anuvijay Township.
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3.4 OVER TIME:

When a worker is made to work more than 9 hrs (including tea, lunch, rest hrs) on any working day or for more than 48 hrs (excluding tea, lunch, rest, etc) in any week he/she shall in respect of overtime work, be paid wages at double the ordinary rate of wages.

$$1. \text{ OT per Hour} = \frac{2 \times \text{Minimum wage of respective category}}{9}$$

4 REGISTRATION OF CONTRACTORS UNDER BOCW Act, 1996:

As per respective site.

The present rate of Cess is one percent of the total cost of construction excluding GST (GST is applicable on BOCW) as per BOCW Welfare Cess Act, 1996 to the extent of Building & Other Construction Works.

The Contractors, covered under BOCW Act and BOCW Cess Act, must get themselves registered under the Act. The copy of registration along with the Challan of Cess paid shall be submitted to ENCs. . The contractor shall indemnify on the Non-judicial stamp paper value of ` 200/- duly attested by Notary as per enclosed format (Annexure-I) before settlement of final bill for the compliance of the BOCW Act, 1996.

5 DEPLOYMENT OF MANPOWER:

As per respective Site / Project

- 5.1 For the contract where minimum man power is specified, the contractor shall ensure that the man power is deployed at all times as per the tender requirements. If contractor fails to meet these conditions, then a penalty as per the Clause No: 18 shall be imposed for any shortfall.
- 5.2 Medical fitness certificate of all manpower has to be submitted by the contractor in the prescribed format before deploying for the job and same has to be revalidated after completion of one year of the contract, wherever applicable. This format titled "Medical Fitness Certificate" is attached in this section as Annexure – C. 18 years and above aged persons only will be permitted to work. However, age limit for crane operator, riggers and forklift operator should not be more than 58 years.
- 5.3 The contractor has to depute his manpower for the mandatory training such as First aid, industrial safety, radiation safety / Emergency Preparedness qualification (wherever applicable) as per the schedule prescribed by NPCIL.
- 5.4 The contractor shall not engage the persons already working with other contractors at KKNPP without NOC from respective contractors.

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Kudankulam Nuclear Power Project	Construction of 203 Nos of Residential Quarters comprising of 40 Nos of E-type (G+10 floor-1 Tower), 80 Nos of D-Special quarters (G+10 floor-2 Tower), 80 Nos of B-type quarters (G+10 floor-2 Tower) and 3 Nos of F Type quarters (G+1 floor) at Anuvijay Township.
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ANNEXURE - A

MEDICAL FITNESS CERTIFICATE

Certified that I, Dr. _____ have examined Shri _____
 aged _____ on (date) _____ who has signed below in my presence.
 General & physical examinations of Shri. _____ do not reveal any abnormality.
 He does not suffer from any acute/chronic skin disease or any contagious or infectious disease. His
 eye sight is normal with/without glasses. In my opinion, Shri _____ is physically and
 mentally fit for working at height.

Details of examinations are given below:

Personal attributes:

1. Height:
2. Chest:
3. Weight:
4. Hearing:
5. Sight:

6. Skin:
7. Heart beating:

Signature of workman:

Medical aspects:

1. Urine:
2. Blood pressure:
3. Epilepsy:
4. Flat foot:
5. Frequent headache
or reeling sensation:

6. Mental depression:
7. Limping gait:
8. Aerophobia:

Name:

Sign:

Rubber Stamp of
 Medical Practitioner
 with Reg. No.

Kudankulam Nuclear Power Project	Construction of 203 Nos of Residential Quarters comprising of 40 Nos of E-type (G+10 floor-1 Tower), 80 Nos of D-Special quarters (G+10 floor-2 Tower), 80 Nos of B-type quarters (G+10 floor-2 Tower) and 3 Nos of F Type quarters (G+1 floor) at Anuvijay Township.
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ANNEXURE - B

WAGE SLIP					
Name of the Contractor/Firm: M/s PF registration no. of the employer.....Date of Payment Work Order No.:					
Name of the worker: Name of worker's Father/Husband:					
Category of Employee:					
Scheduled employment category:					
Wage Period:					
Mode of Payment Universal Account Number (UAN): ESI Number:			Through Bank (Both wage and PF) Bank Name: Branch: Bank Account No.		
Item	Particulars	Rate (Rs./ Unit)	Unit	Quantity	Amount (Rs.)
Payments					
A	Basic Wages		Day		
B	Special Allowance		Day		
C	Transport allowance (as per Section III, Clause No:3.2)		Day		
D	Overtime		Hour		
E	Any other payment (including bonus)		-----		
F	Total (A+B+C+D+E)				
Deduction					
G	EPF @ 12%		Day		
H	Employees ESI Contribution as applicable		Day		
I	Any other deduction		-----		
J	Total Deduction (G+H+I)				
Net Wage (F-J): Rs-----/- (Rupees-----only)					
Contractor's Signature			Worker's Signature or Thumb impression		

For issue of wages certificate, Contractor has to submit self certified following documents:

- a) Copy of Wages Register.
 - b) Details of payment made by contractor to contract workers.
 - c) EPF Electronic challan cum Return including payment confirmation details.
 - d) Details of PF remittance of each contract workers in tabular form.
 - e) ~~ESI deposit challan & payment confirmation details including the details of ESI contributions in respect of each contract workers. If applicable.~~
 - f) Other documents as applicable i.e., proof of Bonus payment etc
- Above documents shall be duly verified by Engineer-in-charge of work.

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Kudankulam Nuclear Power Project	Construction of 203 Nos of Residential Quarters comprising of 40 Nos of E-type (G+10 floor-1 Tower), 80 Nos of D-Special quarters (G+10 floor-2 Tower), 80 Nos of B-type quarters (G+10 floor-2 Tower) and 3 Nos of F Type quarters (G+1 floor) at Anuvijay Township.
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ANNEXURE - C

INDEMNITY BOND

(For compliance of the EPF & MP Act, 1952 & ~~the ESI Act, 1948~~)

(To be furnished by contractor before settlement of final bill)

(To be taken on Non-Judicial Stamp Paper of ₹200)

Whereas M/s (name of the contractor) _____ has been awarded the contract for (name of the work) _____ vide Work Order No. _____ dated _____ by NPCIL, Kudankulam Nuclear Power Project to execute the job/work on the terms and conditions as stipulated therein and as per the agreement.

In pursuance of the above, I/We _____ S/o _____ R/o _____ (address)

_____ and

Proprietor/Partner/Director/authorized representative (Designation) _____ of M/s

(name of the contractor) _____ hereby affirm and declare as follows:

That the provisions of the Employees Provident Fund & Miscellaneous Provisions Act, 1952 and ~~the Employees State Insurance Act, 1948~~ have been complied and it is undertaken that all the liabilities on account of EPF and ~~ESI contribution/dues~~ for the employees/workers deployed by M/s. (Name of the Contractor) _____ for the work and indemnify NPCIL of any future liabilities on this account. I shall be stand responsible for any such future claim and action/proceeding if any, with regard to EPF and ~~ESIC dues/outstanding~~ received through concerned authorities.

Further, I shall keep NPCIL fully indemnified and free from all such EPF and ~~ESIC dues/outstanding~~ claims/demands, actions/proceedings if any, against NPCIL in respect of aforesaid contract and NPCIL shall have no liabilities on this account.

In witness whereof, I/We _____ on behalf of M/s _____ executed this indemnity bond on (date) _____ mentioned above.

(Signature of contractor)

Authorised Representative of Contractor

With Company's seal

Witnesses:

1. Name :
Address :
Signature :
2. Name :
Address :
Signature :

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Kudankulam Nuclear Power Project	Construction of 203 Nos of Residential Quarters comprising of 40 Nos of E-type (G+10 floor-1 Tower), 80 Nos of D-Special quarters (G+10 floor-2 Tower), 80 Nos of B-type quarters (G+10 floor-2 Tower) and 3 Nos of F Type quarters (G+1 floor) at Anuvijay Township.
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ANNEXURE-D

CERTIFICATE OF ISSUE OF UNIFORM & SHOE

I M/s_____ have issued _____ pairs of uniform consists of shirt, trouser and _____ pairs of shoes on _____ ,as per the tender conditions for the following workers engaged by me against WO No:_____ dated:_____.

Sl.No.	Name of Employee.	RFID card No.	Signature of employee.
1			
2			
3			
4			
5			

Signature of the contractor

Signature of department Representative

Kudankulam Nuclear Power Project	Construction of 203 Nos of Residential Quarters comprising of 40 Nos of E-type (G+10 floor-1 Tower), 80 Nos of D-Special quarters (G+10 floor-2 Tower), 80 Nos of B-type quarters (G+10 floor-2 Tower) and 3 Nos of F Type quarters (G+1 floor) at Anuvijay Township.
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ANNEXURE-E

EPF - RECOVERY UNDERTAKING FORM UNDER PMRPY SCHEME

Statement of EPF paid for workmen for the duration from _____ to _____

Name of Work:

Work order no:

Name of Contractor:

R A Bill No: _____ for the month of _____

S.No.	Name of worker	EPF UAN No.	EPF Amount paid	Reimbursed amount (upfront benefit) under PMRPY	Remark.
Total reimbursed(upfront benefit) amount under PMRPY					

I/We hereby authorize NPCIL to recover Rs_____ reimbursed by Government of India (GOI) under PMRPY, from our RA bill / Final bill. We also undertake to pass on any future benefit received, under PMRPY scheme.

**Signature of Authorized Signatory
with stamp.**

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Section - III	Special Instructions	Page 32 of 55
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Kudankulam Nuclear Power Project	Construction of 203 Nos of Residential Quarters comprising of 40 Nos of E-type (G+10 floor-1 Tower), 80 Nos of D-Special quarters (G+10 floor-2 Tower), 80 Nos of B-type quarters (G+10 floor-2 Tower) and 3 Nos of F Type quarters (G+1 floor) at Anuvijay Township.
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ANNEXURE-F

SECURITY DEPOSIT REFUND REQUEST FORM UNDER PMRPY SCHEME

Statement of EPF paid for workmen for the duration from _____ to _____

Name of Work:

Work order no:

Name of Contractor:

Till final bill, total amount of Rs_____ had been reimbursed by GOI under PMRPY and the same had been recovered by NPCIL till final bill payment (RA Billwise breakup of recovery is enclosed). And now, for the time elapsed between final bill and till date, Rs_____ has been reimbursed to us under PMRPY. I/We hereby authorize NPCIL to recover Rs _____ reimbursed by Government of India (GOI) under PMRP, for the time elapsed between final bill and till date from our security deposit. We also undertake to pass on any future benefit received, under PMRPY scheme.

**Signature of Authorized Signatory
with stamp.**

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Kudankulam Nuclear Power Project	Construction of 203 Nos of Residential Quarters comprising of 40 Nos of E-type (G+10 floor-1 Tower), 80 Nos of D-Special quarters (G+10 floor-2 Tower), 80 Nos of B-type quarters (G+10 floor-2 Tower) and 3 Nos of F Type quarters (G+1 floor) at Anuvijay Township.
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ANNEXURE-G

INDEMNITY BOND

(For compliance of the BOCW Act, 1996)
 (To be furnished by contractor before settlement of final bill)
 (To be taken on Non-Judicial Stamp Paper of `200)

This Indemnity Bond is executed on this _____ day of _____ by
 M/s. _____ having its registered office at _____ (herein
 after

referred to as "Contractor", which expression shall unless it be repugnant to the context or meaning thereof, be deemed to mean and include their respective assigns, successors, executors and/or administrators) of the one part AND

M/s.Kudankulam Nuclear Power Project, a Unit of Nuclear Power Corporation of India Limited, Radhapuram Taluk, Tirunelveli District, Tamil Nadu – 627106 (hereinafter referred to as the "Company", which expression shall unless it be repugnant to the context or meaning thereof be deemed to mean and include its assigns, successors,) of the other part.

Whereas the Company has entered into a contract with the Contractor for the "_____", Vide Work Order No. ----- valued at Rs _____
 (Rupees _____ only) (hereinafter called the "Contract");

That the provisions of the **Building and Other Construction Workers** (BOCW) Act, 1996 have been complied and it is undertaken that all the liabilities on account of BOCW contribution/dues for the employees/workers deployed by M/s. _____ (Name of the Contractor) _____ for the work and indemnify NPCIL of any future liabilities on this account. I shall be stand responsible for any such future claim and action/proceeding if any, with regard to BOCW dues/outstanding received through concerned authorities.
 Further, I shall keep NPCIL fully indemnified and free from all such BOCW dues/outstanding claims/demands, actions/proceedings if any, against NPCIL in respect of aforesaid contract and NPCIL shall have no liabilities on this account.

For and On behalf of M/s. _____

NAME _____

(Authorized Signatory)

Rubber Stamp of Firm / Contractor's Company

NAME AND SIGNATURE OF WITNESSES

1. _____
2. _____

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Kudankulam Nuclear Power Project	Construction of 203 Nos of Residential Quarters comprising of 40 Nos of E-type (G+10 floor-1 Tower), 80 Nos of D-Special quarters (G+10 floor-2 Tower), 80 Nos of B-type quarters (G+10 floor-2 Tower) and 3 Nos of F Type quarters (G+1 floor) at Anuvijay Township.
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ANNEXURE-H

Declaration Form for GST

The Supplier/Contractors while submitting their bill to the Paying Authority shall furnish the following certificates:

Certified that: (Please Tick all appropriate boxes)

- (a) Additional Input credit tax under GST availed against Invoice submitted here under is Rs.....
- (b) The goods and services on which GST has been charged are not exempted under the GST Act or rules made there under and the amount charged on account of GST on these goods and services are not more than what is payable under the relevant act or the rules there under.
- (c) We have taken into account all input tax credits available under GST and have not loaded the same in the basic price while furnishing their bids.
- (d) In respect of the amount of taxes claimed in the bill no claim is pending for refund/ or is admissible for refund for any other agency and / or no other tax credit is available in respect of the same. In the event of getting refund in whole or in part of the element of GST claimed from Government, the same shall be passed on the benefit to the Purchaser by remitting the amount equivalent to the amount of refund obtained.
- (e) The GST charges herein the invoices and other details have been populated in GSTR1 of the GSTN portal facilitating Input credit to the Purchaser.
- (f) We have complied with the Anti-profiteering measure provisions under CGST/SGST/UTGST Acts and passed on commensurate reduction of price to the purchaser.

Signature of Contractor or their Authorized Representative with Company Seal

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Kudankulam Nuclear Power Project	Construction of 203 Nos of Residential Quarters comprising of 40 Nos of E-type (G+10 floor-1 Tower), 80 Nos of D-Special quarters (G+10 floor-2 Tower), 80 Nos of B-type quarters (G+10 floor-2 Tower) and 3 Nos of F Type quarters (G+1 floor) at Anuvijay Township.
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न्यूक्लियर पावर कॉर्पोरेशन ऑफ इंडिया लिमिटेड Nuclear Power Corporation of India Ltd.
(भारत सरकार का उद्यम A Government of India Enterprise)



कुडनकुलम न्यूक्लियर पावर प्रोजेक्ट Kudankulam Nuclear Power Project

कुडनकुलम पोस्ट, राधापुरम तालुक, तिरुनेलवेली जिला, तमिलनाडु 627106-
Kudankulam P.O., Radhapuram Taluk, Tirunelveli District, Tamil Nadu – 627 106

FIRST RA BILL COVERING LETTER CUM CHECK LIST

Work order No. _____ M/s. _____
Wo Value _____ Work Start Date _____ Actual Completion Date _____
Name of EIC _____ Unit & Section _____ Defect Liability Period _____

Sr. No.	Description of Documents	Enclosure No.& Page No	Remarks
1.	Copies of the RA Bill, Escalation Bill (if any), MOP through CoManaS and duly signed by Contractor / valid attorney holder of the contractor and the EIC verifying measurement. Please note that the entry in 'Bill for the month' must be the month of entry in 'Bill for the month' must be the month of 'measured till date'		
2.	Power of Attorney / Partnership deal on Non-Judicial Stamp Paper duly Notarization letter. (wherever applicable)		
3.	Tender opening attendance sheet (in case of manual tenders)		
4.	Copy of Note leading Award of work and Technical Sanction.		
5.	Copy of Comparative Statement of Tender approved during award of wok.		
6.	a) Agreement copy duly vetted by F&A including amendment, if any containing LOI and WO acceptance as per tender condition (if not submitted in RAB-1, an affidavit (see note 3) to be submitted.) b) In case the Agreement is waived off, copy of NIT along with tender document and WO acceptance.		
7.	a) Performance Guarantee (PBG) issued by a scheduled commercial bank as per GCC / WO with validity up to DLP plus 90 days claim period duly forwarded by the EIC (see note 5) b) No. of days delayed, if any in PBG submission as per GCC.		
8.	Copy of communication for WO commencement date and change in commencement date, if any		
9.	Tax Related / Statutory Compliance : a) Original GST compliant TAX INVOICE indicating WO number and bill period. b) Declaration from for GST from contractor as per NIT in addition		

Kudankulam Nuclear Power Project	Construction of 203 Nos of Residential Quarters comprising of 40 Nos of E-type (G+10 floor-1 Tower), 80 Nos of D-Special quarters (G+10 floor-2 Tower), 80 Nos of B-type quarters (G+10 floor-2 Tower) and 3 Nos of F Type quarters (G+1 floor) at Anuvijay Township.
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	to GST payment challan copy where WO raters are exclusive of GST. c) Registration copy of GST Certificate , PAN, EPF registration, Labour license, ESIC registration , Professional tax registration, if copies are not submitted to F&A along with vetted WO. d) Contractor Bank A/C details such as cancelled cheque, bank address , RTGS details. e) EPF / ESIC deposit challan for the month earlier to the preceding month , however not applicable , if first RA bill submitted in the next month of execution. f) In case exemption from TDS (if any), copy of valid exemption certificate to be forwarded.		
10.	Copies of Insurance Policies as per IRDA Rules and as per work order conditions up to DLP in the joint name of NPCIL and the contractor:- a) CAR Policy valid up to : b) TPL policy valid up to : c) ESIC (Employee Compensation Policy, in case not covered ESIC) valid up to:		
11.	Copies of Transit / Storage insurance policies along with indemnity bond of required value as per work order / tender conditions (if applicable) in case if material / equipment goes outside NPCIL premises.		
12.	If any material issued on chargeable basis, then recovery of the same has been proposed in RA bill along with material accounting statement for verification of amount (if applicable)		
13.	For hiring charges of cranes, vehicles, equipment sets. (if applicable). EIC to ensure that GST invoice is raised within the due date as per Rules before forwarding the bill to F&A and invoice copy is attached with the bill and no recovery is due in the respect.		
14.	All recoveries / penalties verified and effected / proposed in bill as per tender / WO conditions/ EIC to ensure that GST invoice is raised within the due date as per Rules before forwarding the bill to F&A and invoice copy is attached with the bill.		
15.	EIC certificate for RA bill in CoManaS format		
16.	Labour payment certificate from HR-IR section as required under GCC / NIT / WO		
17.	Valid labour licence, if applicable, specific to the contract as per extant Labour Law.		
18.	Reference of liability provision for works done but not paid by 31 st March for the respective year. If not so provided , being a prior period expenditure an approval to be obtained from Competent Authority, if applicable.		

Note :

1. The above check list is commonly applicable. However , if further any specific documents required for the checking of the bill, the same may be provided on case to case basis.

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Kudankulam Nuclear Power Project	Construction of 203 Nos of Residential Quarters comprising of 40 Nos of E-type (G+10 floor-1 Tower), 80 Nos of D-Special quarters (G+10 floor-2 Tower), 80 Nos of B-type quarters (G+10 floor-2 Tower) and 3 Nos of F Type quarters (G+1 floor) at Anuvijay Township.
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2. Any deviation (s) should be approved by the Competent Authority as per HQI/ GCC.
3. Such affidavit should contain a valid reason for such non-compliance duly accepted by the EIC and however , this will not prejudice the liability of the contractor under GCC.
4. Proof of GST deposit with challan is to be submitted where specific approval exists and / or required under WO Conditions.
5. For conducting verification of bank guarantee, e-mail ID of the issuing bank is to be provided while forwarding the PBG to F&A .
6. Copies of all supporting documents to be signed / certified by EOC as per GCC clause no. 12.2.3.
7. All documents should have page number serially.
8. The requisite certificates / Statements should be in CoManaS format, wherever applicable.

Date:

(Signature of EIC)

F&A

Kudankulam Nuclear Power Project	Construction of 203 Nos of Residential Quarters comprising of 40 Nos of E-type (G+10 floor-1 Tower), 80 Nos of D-Special quarters (G+10 floor-2 Tower), 80 Nos of B-type quarters (G+10 floor-2 Tower) and 3 Nos of F Type quarters (G+1 floor) at Anuvijay Township.
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न्यूक्लियर पॉवर कॉर्पोरेशन ऑफ इंडिया लिमिटेड Nuclear Power Corporation of India Ltd.
(भारत सरकार का उद्यम A Government of India Enterprise)



कुडनकुलम न्यूक्लियर पॉवर प्रोजेक्ट Kudankulam Nuclear Power Project

कुडनकुलम पोस्ट, राधापुरम तालुक, तिरुनेलवेली जिला, तमिलनाडु 627106-
Kudankulam P.O., Radhapuram Taluk, Tirunelveli District, Tamil Nadu – 627 106

SUBSEQUENT RA BILL COVERING LETTER CUM CHECK LIST

Work order No. _____ M/s. _____

Wo Value _____ Work Start Date _____ Actual Completion Date _____

Name of EIC _____ Unit & Section _____ Defect Liability Period _____

Sr. No.	Description of Documents	Enclosure No.& Page No	Remarks
1.	Copies of the RA Bill, Escalation Bill (if any), MOP through CoManaS and duly signed by Contractor / valid attorney holder of the contractor and the EIC verifying measurement. Please note that the entry in 'Bill for the month' must be the month of entry in 'Bill for the month' must be the month of 'measured till date'		
2.	If not furnished with 1 st RAB: a) Agreement copy duly vetted by F&A including amendment, if any containing LOI and WO acceptance (as per tender condition) b) In case the Agreement is waived off. Copy of NIT along with tender document and WO acceptance.		
3.	Copy of approval for provisional extension of time with financial concurrence , if applicable		
4.	Copy of approval with financial concurrence for all Additional Quantity / Extra / Substituted items. Further the same to be updated in CoManaS before claiming payment in bill		
5.	Tax Related / Statutory Compliance: a) Original GST compliant TAX INVOICE including WO number and bill period. b) Declaration form for GST as Annexure-H of NIT in addition to GST payment challan copy where WO rates exclusive of GST. [also see note 3] c) EPF / ESIC deposit challan for the month earlier to the preceding month. d) In case exemption from TDS (if any), copy of extension to valid extension certificate. e) Change in contractor's bank account details, if any		
6.	Validity or extension of labour licence, if applicable		
7.	a) Whether validity of performance Guarantee (PBG) exists as per		

Kudankulam Nuclear Power Project	Construction of 203 Nos of Residential Quarters comprising of 40 Nos of E-type (G+10 floor-1 Tower), 80 Nos of D-Special quarters (G+10 floor-2 Tower), 80 Nos of B-type quarters (G+10 floor-2 Tower) and 3 Nos of F Type quarters (G+1 floor) at Anuvijay Township.
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	GCC / WO with validity up to DLP plus 90 days claim period. b) BG / TDR / STDR in lieu of Retention money, if any as per clause 4.2.6 of GCC		
8.	In case of extension of validity , copies of Insurance Policies as per work order / tender / conditions to DLP in joint name of NPCIL and the Contractor: a) CAR Policy valid up to : b) TPL policy valid up to : c) ESIC (Employee Compensation Policy , in case not covered under ESIC) valid up to :		
9.	Copies of Transit / Storage insurance policies along with indemnity bond of requisite value as per Work Order / tender conditions (if applicable) in case if material / equipment goes outside NPCIL premises		
10.	If any material issued on chargeable basis, then recovery of the same has been proposed in RA bill along with material accounting statement for verification of amount . (in applicable)		
11.	For hiring charges of cranes, vehicles , equipment etc. (If Applicable). EIC to ensure that GST invoice is raised within the due date as per Rules before forwarding the bill to F&A and invoice copy is attached with the bill and no recovery is due in this respect.		
12.	All recoveries/ penalties verified and effected / proposed in Bill as per tender / WO conditions. EIC to ensure that GST invoice is raised within the due date as per Rules before forwarding the bill to F&A and invoice copy is attached with the bill.		
13.	EIC certificate for RA bill in CoManaS Format		
14.	Labour Payment Certificate from HR-IR section as required under GCC / NIT / WO		
15.	Reference of liability provision for works done but not paid by 31 st March for the respective year. If not son provided , being a prior period expenditure and approval to be obtained from Competent Authority, if applicable.		

Note:

1. The above check list is commonly applicable. However , if further any specific documents required for the checking of the bill, the same may be provided on case to case basis.
2. Any deviation (s) should be approved by the Competent Authority as per HQI / GCC.
3. Proof of GST deposit with challan is to be submitted where specific approval exists and / or required under WO conditions.
4. Copies of all supporting documents to be signed / certified by EOC as per GCC clause no. 12.2.3.
5. All documents should have page number serially.
6. The requisite certificates / statements should be in CoManaS format, wherever applicable.

Date :

(Signature of EIC)

F&A

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Kudankulam Nuclear Power Project	Construction of 203 Nos of Residential Quarters comprising of 40 Nos of E-type (G+10 floor-1 Tower), 80 Nos of D-Special quarters (G+10 floor-2 Tower), 80 Nos of B-type quarters (G+10 floor-2 Tower) and 3 Nos of F Type quarters (G+1 floor) at Anuvijay Township.
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न्यूक्लियर पावर कॉर्पोरेशन ऑफ इंडिया लिमिटेड Nuclear Power Corporation of India Ltd.
(भारत सरकार का उद्यम A Government of India Enterprise)



कुडनकुलम न्यूक्लियर पावर प्रोजेक्ट Kudankulam Nuclear Power Project

कुडनकुलम पोस्ट, राधापुरम तालुक, तिरुनेलवेली जिला, तमिलनाडु 627106-
Kudankulam P.O., Radhapuram Taluk, Tirunelveli District, Tamil Nadu – 627 106

FIRST & FINAL BILL COVERING LETTER CUM CHECK LIST

Work order No. _____ M/s. _____
Wo Value _____ Work Start Date _____ Actual Completion Date _____
Name of EIC _____ Unit & Section _____ Defect Liability Period _____

Sr. No.	Description of Documents	Enclosure No.& Page No	Remarks
1.	Copies of First & Final Bill, Escalation Bill (if any), MOP through CoManaS and duly signed by Contractor / valid attorney holder of the contractor and the EIC verifying measurement. Please note that the entry in 'Bill for the month' must be the month of entry in 'Bill for the month' must be the month of 'measured till date'		
2.	Power of Attorney / Partnership deal on Non-Judicial Stamp Paper duly Notarized / authorization letter. (wherever applicable)		
3.	Tender opening attendance sheet (in case of manual tenders)		
4.	Copy of Note leading Award of work and Technical Sanction.		
5.	Copy of Comparative Statement of Tender approved during award of wok.		
6.	a) Agreement copy duly vetted by F&A including amendment, if any containing LOI and WO acceptance as per tender condition. b) In case the Agreement is waived off, copy of NIT along with tender document and WO acceptance.		
7.	a) Performance Guarantee (PBG) issued by a scheduled commercial bank as per GCC / WO with validity up to DLP plus 90 days claim period duly forwarded by the EIC (see note 4) b) No. of days delayed, if any in PBG submission as per GCC.		
8.	Status of validity of Guarantee Bond / Additional Security (if any applicable) during the DLP		
9.	Copy of communication for WO commencement date and change in commencement date, if any		
10.	Completion certificate in CoManaS format without any manual correction. (Any Addl. Information shall not be treated as correction)		
11.	Compliance Certificate as per GCC clause No. 5.5.5 in CoManaS format		
12.	Inspection Certificate ComanaS format without any manual correction..		
13.	No Demand Certificate in the contractor's letter head as per CoManaS specified format (to be submitted along with approved variation		

Kudankulam Nuclear Power Project	Construction of 203 Nos of Residential Quarters comprising of 40 Nos of E-type (G+10 floor-1 Tower), 80 Nos of D-Special quarters (G+10 floor-2 Tower), 80 Nos of B-type quarters (G+10 floor-2 Tower) and 3 Nos of F Type quarters (G+1 floor) at Anuvijay Township.
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	statement)		
14.	Copy of Final Time Extension approval with financial concurrence, if proposal of final time extension is under process parallelly, then mention accordingly while forwarding final bill.		
15.	Copy of approval with financial concurrence for all Additional Qty/Extra/Substituted items. Further the same to be updated in CoManaS before claiming payment in bill..		
16.	Tender structure statement through CoManaS System for the L1 Position duly signed by EIC and checked by F&A.		
17.	Labour Payment Certificate from HR-IR section up to <u>actual date of completion</u> as required under GCC / NIT / WO.		
18.	The Contractor shall indemnify on stamp paper for appropriate value that provision of EPF & MP act- 1952 applicable have been compiled with and contractor will stand responsible for any future received from any agencies (if applicable)		
19.	No dues certificate from (before releasing payment) a) CISF b) Health Physics Unit (applicable for Radiation and WMP areas) c) Safety Section d) Material Accounting section (MAIS) (if applicable) e) HR-EM or HR-HS or any other agency.		
20.	Tax Related / Statutory Compliance a) Original GST compliant TAX INVOICE indication WO number and bill period. b) Declaration copy of GST as Annexure-H of NIT in addition to GST payment challan copy where WO rates are exclusive of GST [also see note-3] c) Registration copy of GST Certificate PAN, EPF Registration, Labour License, ESIC Registration, Professional tax registration, if copies are not submitted to F&A along with vetted WO d) Contractor Bank A/c details such as cancelled cheque, bank address, RTGS details. e) EPF / ESIC deposit challan f) In case exemption from TDS (if any), copy of valid exemption certificate to be forwarded. g) Certificate from a Chartered Accountant on GST payment after setting off and passing on to NPCIL for all applicable with respect to be contract <u>in the given format</u>		
21.	Approval with financial concurrence for extra Tax Difference (Service tax, GST etc. as per applicability)		
22.	Copies of Insurance Policies as per IRDA Rules and as per work order conditions up to DLP in joint name of NPCIL and the Contractor a)CAR policy valid up to:		

Kudankulam Nuclear Power Project	Construction of 203 Nos of Residential Quarters comprising of 40 Nos of E-type (G+10 floor-1 Tower), 80 Nos of D-Special quarters (G+10 floor-2 Tower), 80 Nos of B-type quarters (G+10 floor-2 Tower) and 3 Nos of F Type quarters (G+1 floor) at Anuvijay Township.
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	b) TPL Policy valid up to: c) ESIC (Employee Compensation Policy, in case not covered under ESIC) valid up to:		
23.	Copies of Transit / storage insurance policies along with indemnity bond of requisite value as per work order / tender conditions (if applicable) in case if material / equipment goes outside NPCIL TMS premises		
24.	If any material issued on chargeable basis, then recovery of the same has been proposed in RA bill along with material accounting statement for verification of amount (if applicable)		
25.	For hiring charges of cranes, vehicles, equipment etc. (if applicable). EIC to ensure that GST invoice is raised within the due date as per Rules before forwarding the bill to F&A and invoice copy if attached with the bill and no recovery is due in this respect.		
26.	All recoveries / penalties verified and effected / proposed in Bill as per tender / WO conditions. EIC to ensure that GST invoice is raised within the due date as per Rules before forwarding the bill to F&A and invoice copy is attached with the bill.		
27.	EIC certificate for the bill in CoManaS format		
28.	Valid labour license, if applicable specific to the contract as per extant Labour Law		
29.	Reference of liability provision for works done but not paid by 31st March for the respective year. If not so provided, being a prior period expenditure an approval to be obtained from Competent Authority, if applicable.		
30.	Confirm whether any litigation / dispute matter pending against the WO (furnish copy of relevant document, viz., arbitration award)		
31.	Variation Statement in CoManaS along with Standard format enclosed. If variation statement is under process parallelly, then mention accordingly while forwarding the draft final bill for checking purpose		
32.	Approval for foreclosure / short closure of the WO (if applicable)		

Note:

1. The above check list is commonly applicable. However, if further any specific documents required for the checking of the bill, the same may be provided on case to case basis.
2. Any deviation (s) should be approved by the Competent Authority as per HQI/ GCC.
3. Proof of GST deposit with challan is to be submitted where specific approval exists and / or required under WO Conditions.
4. For conducting verification of bank guarantee, e-mail ID of the issuing bank is to be provided while forwarding the PBG to F&A .
5. Copies of all supporting documents to be signed / certified by EOC as per GCC clause no. 12.2.3.
6. All documents should have page number serially.
7. The requisite certificates / Statements should be in CoManaS format, wherever applicable.

Date :

(Signature of EIC)

F&A

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Kudankulam Nuclear Power Project	Construction of 203 Nos of Residential Quarters comprising of 40 Nos of E-type (G+10 floor-1 Tower), 80 Nos of D-Special quarters (G+10 floor-2 Tower), 80 Nos of B-type quarters (G+10 floor-2 Tower) and 3 Nos of F Type quarters (G+1 floor) at Anuvijay Township.
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न्यूक्लियर पॉवर कॉर्पोरेशन ऑफ इंडिया लिमिटेड Nuclear Power Corporation of India Ltd.

(भारत सरकार का उद्यम A Government of India Enterprise)

कुडनकुलम न्यूक्लियर पॉवर प्रोजेक्ट Kudankulam Nuclear Power Project

कुडनकुलम पोस्ट, राधापुरम तालुक, तिरुनेलवेली जिला, तमिलनाडु 627106-

Kudankulam P.O., Radhapuram Taluk, Tirunelveli District, Tamil Nadu – 627 106



Format of certificate to be submitted in work order final bill

On letter head of a CA

This is to certify that the GST under the registration no. _____ as per following invoice issued by M/s. _____ is deposited after setting off for all inputs , capital inputs and input services as applicable and ITC passed on to NPCIL under the work order no. _____

RA Bill No	Invoice No.	Invoice Date	Taxable value	GST	Challan No.	Challan date
1						
2						
3						
4						
5						
6						
7						
8						
9						
10						
11						
12						

(All bills including the final bill are to be listed)

I/We hereby further confirm that the above information is correct to the best of my knowledge and belief. WE took all responsibility regarding correctness and authenticity of the above information.

Date:

Signe & sealed by
Chartered Accountant with membership no.

Through The Contractor

M/s. _____

(Authorized Signatory)

Work Order No. _____

Forwarded by: Engineer – In – Charge

(Signature)

To be submitted in original to:

Manager (F&A)

Works

Section - III	Special Instructions	Page 44 of 55
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Kudankulam Nuclear Power Project	Construction of 203 Nos of Residential Quarters comprising of 40 Nos of E-type (G+10 floor-1 Tower), 80 Nos of D-Special quarters (G+10 floor-2 Tower), 80 Nos of B-type quarters (G+10 floor-2 Tower) and 3 Nos of F Type quarters (G+1 floor) at Anuvijay Township.
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न्यूक्लियर पॉवर कॉर्पोरेशन ऑफ इंडिया लिमिटेड Nuclear Power Corporation of India Ltd.

(भारत सरकार का उद्यम A Government of India Enterprise)

कुडनकुलम न्यूक्लियर पॉवर प्रोजेक्ट Kudankulam Nuclear Power Project

कुडनकुलम पोस्ट, राधापुरम तालुक, तिरुनेलवेली जिला, तमिलनाडु 627106-

Kudankulam P.O., Radhapuram Taluk, Tirunelveli District, Tamil Nadu – 627 106



FINAL BILL COVERING LETTER CUM CHECK LIST

Work order No. _____ M/s. _____
 Wo Value _____ Work Start Date _____ Actual Completion Date _____
 Name of EIC _____ Unit & Section _____ Defect Liability Period _____

Sr. No.	Description of Documents	Enclosure No. & Page No	Remarks
1.	Copies of Final Bill, Escalation Bill (if any), MOP through CoManaS and duly signed by Contractor / valid attorney holder of the contractor and the EIC verifying measurement. Please note that the entry in 'Bill for the month' must be the month of 'measured till date'		
2.	Power of Attorney / Partnership deed on Non-Judicial Stamp Paper duly Notarized / authorization letter. (if there is any change in earlier)		
3.	Status of security deposit, i.e. whether released , if not than status of its validity, a) Performance Guarantee (PBG) issued by a scheduled commercial bank as per GCC / WO with validity up to DLP plus 90 days claim period b) BG/TDR/STDR in lieu of Retention money, if any as per clause 4.2.6 of GCC		
4.	Status of validity of Guarantee Bond / Additional Security (if any applicable) during the DLP		
5.	Completion certificate in CoManaS format without any manual correction. (Any Additional Information shall not be treated as correction)		
6.	Compliance Certificate as per GCC clause No.5.2.2 in CoManaS format		
7.	Inspection Certificate ComanaS format without any manual correction..		
8.	No Demand Certificate in the contractor's letter head as per CoManaS format (to be submitted along with approved variation statement)		
9.	Copy of Final Time Extension approval with financial concurrence, if proposal of final time extension is under process, then mention accordingly while forwarding final bill.		
10.	Copy of Final Time extension approval with financial concurrence for additional Qty. / Extra / substituted items. Further the same to be updated in CoManaS before claiming payment in bill. If proposal of final time		

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	extension is under process, then mention accordingly while forwarding bill.		
11.	Tender structure statement through CoManaS System for the L1 Position duly signed by EIC and checked by F&A.		
12.	Labour Payment Certificate from HR-IR section up to actual date of completion as required under GCC / NIT / WO.		
13.	The Contractor shall indemnify on stamp paper for appropriate value that provision of EPF & MP act- 1952 applicable have been completed with and contractor will stand responsible for any future claims received from any agencies (if applicable)		
14.	No dues certificate from : (before releasing payment) a) Security Section b) Safety Section c) Health Physics Unit (applicable for Radiation d) and WMP areas) e) Material Accounting section (MAIS) (if applicable) f) HR-EM or HR-HS or any other agency.		
15.	Tax Related / Statutory Compliance a) Original GST compliant TAX INVOICE indication WO number and bill period. b) Declaration copy of GST as Annexure-H of NIT in addition to GST payment challan copy where WO rates are exclusive of GST [also see note-3] c) EPF / ESIC deposit challan d) In case exemption from TDS(if any), copy of valid exemption certificate to be forwarded. e) Change in Contractor's bank account details , if any. f) Certificate from a Chartered Accountant on GST payment after setting off and passing on to NPCIL for all applicable with respect to be contract in the given format		
16.	Approval with financial concurrence for extra Tax Difference (Service tax, GST etc. as per applicability)		
17.	Copies of extension of validity of Insurance Policies, if any as per work order conditions up to DLP in joint name of NPCIL and the Contractor a) CAR policy valid up to: b) TPL Policy valid up to: c) ESIC (Employee Compensation Policy, in case not covered under ESIC) valid up to:		
18.	Copies of Transit / storage insurance policies along with indemnity bond of requisite value as per work order / tender conditions (if applicable) in case if material / equipment goes outside NPCIL TMS premises		
19.	If any material issued on chargeable basis, then recovery of the same has been proposed in RA bill along with material accounting statement for verification of amount (if applicable)		
20.	For hiring charges of cranes, vehicles, equipment etc. (if applicable). EIC to		

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	ensure that GST invoice is raised within the due date as per Rules before forwarding the bill to F&A and invoice copy if attached with the bill and no recovery is due in this respect.		
21.	All recoveries / penalties verified and effected / proposed in Bill as per tender / WO conditions. EIC to ensure that GST invoice is raised within the due date as per Rules before forwarding the bill to F&A and invoice copy is attached with the bill.		
22.	EIC certificate for the bill in CoManaS format		
23.	Whether the work period under final bill has been executed within the validity of labour license as applicable under extant Labour Law		
24.	Reference of liability provision for works done but not paid by 31st March for the respective year. If not so provided, being a prior period expenditure an approval to be obtained from Competent Authority, if applicable.		
25.	Confirm whether any litigation / dispute matter pending against the WO (furnish copy of relevant document, viz., arbitration award)		
26.	Variation Statement in CoManaS along with Standard format enclosed. If variation statement is under process parallelly, then mention accordingly while forwarding the draft final bill for checking purpose		
27.	Approval for foreclosure / short closure of the WO (if applicable)		

Note :

1. The above check list is commonly applicable. However , if further any specific documents required for the checking of the bill, the same may be provided on case to case basis.
2. Any deviation (s) should be approved by the Competent Authority as per HQI/ GCC.
3. Proof of GST deposit with challan is to be submitted where specific approval exists and / or required under WO Conditions.
4. Copies of all supporting documents to be signed / certified by EOC as per GCC clause no. 12.2.3.
5. All documents should have page number serially.
6. The requisite certificates / Statements should be in CoManaS format, wherever applicable.

Date :

(Signature of EIC)

F&A

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Special Instructions – Special Conditions of Contract

PART-III

SECTIONAL SPECIAL CONDITIONS OF CONTRACT SPECIFIC TO WORK

1. LAYOUT AND LEVELS

The contractor shall layout his work from base lines established by the Corporation and shall be responsible for all measurements in connection there with. The contractor shall construct and maintain proper bench marks at the site. Total Station, Theodolite, Levels, Prismatic compass, chain, steel and metallic tapes, and all other instruments necessary for the work shall be arranged by the contractor for use in connection with this work.

2. TRAFFIC INTERFERENCE WITHIN THE CONSTRUCTION SITE

The contractor shall conduct his operations for transportation of construction material and concrete making materials in such a manner as to interfere as little as possible with the traffic and township activity. The contractor shall take all-precautionary and other measures, such as providing warning signals, temporary diversions etc. as required. The contractor shall exercise full care to ensure that no damage is caused by him or his workmen, during the operations, to the existing water supply and power lines. The cost of any such damage and risks arising out of this shall be entirely borne by the contractor. The contractor shall not deposit materials on any site, which will cause inconvenience. The Engineer may ask the contractor to remove any materials, which are considered to be of danger or inconvenient at the contractor's cost.

Contractor shall provide the necessary road barriers and road speed breakers as per the instructions of engineer in charge wherever the material transportation road is crossing the existing roads. Wherever necessary flickering lights shall be provided at road crossings as directed by NPCIL.

3. BARRICADING OF WORK SITE

Contractor shall barricade the entire work site with GI sheets of minimum height of 12 feet with one controlled entry point. The GI Sheets used should be of good condition and it should not be rusted, torn, bend and shall be got approved before using in the barricading work. Notwithstanding the specification mentioned herein the barricading including support should be strong enough to withstand wind pressure and remain in proper position during the contract period. The contractor shall assess the quantity required for the same based on the layout drawings of different clusters. The contractor shall include the necessary cost of the same in the

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quote and no separate payment will be made by NPCIL. The necessary barricading shall be completed before commencement of actual construction work.

4. SPECIFICATIONS AND DRAWINGS

The Bidder shall note that tender drawings listed in Section VI of this document are meant for contractor's guidance. It is the contractor's responsibility to assess the volume and complexity of work before quoting his rates.

The Bidder shall also note that:

- (a) The work shall conform to the contract technical specifications enclosed.
- (b) The tender drawings are preliminary drawings issued for understanding of the scope & nature of works to enable contractor to submit the quote. Some of the details may change later during release of drawings "for construction". Works shall be executed as per details shown in the latest revision of drawings.
- (c) Prior to execution of the work, the contractor shall check drawings and shall immediately report all errors, discrepancies and /or omissions observed therein to the Engineer. All such errors discrepancies and /or omissions will be addressed by the Engineer.

5. CONSTRUCTION PROGRAMME / CONSTRUCTION SCHEDULE

The time allowed for carrying out the work as entered in the tender shall be strictly observed by the contractor and the time shall be deemed to be the essence of the contract and shall be reckoned from the date indicated in the work order. All the work shall complete within 30 months from date of commencement of the work. On award of work, within 15 days the Contractor shall prepare and submit a detailed resource based construction time schedule for monitoring physical and financial progress in consultation with Engineer. He shall prepare and submit Level-2 network for the approval of the Engineer which shall form the part of the contract. The contractor

shall strictly adhere to such schedule and rolling plan (3/6months). Contractor shall further submit Level-4 schedules in line with the approved Level-2 schedule. Regular updating of the schedule as per the progress of work shall be submitted. The contractor shall prepare and submit daily,

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weekly and monthly planning and progress reports in the prescribed formats to be finalized in consultation with Engineer in charge.

6. ROADS WITHIN THE WORK SITE

The roads required by the contractor for the construction purpose shall be constructed by him at his own cost. Location of such roads shall however be subject to the prior approval of the Engineer.

Contractor shall clean the spillover concrete/ rock and the other materials over the roads used by him regularly and take necessary action to avoid dust hazard by regularly sprinkling water on the road at his own cost.

Contractor shall repair the damage(s) if any to the road formed by NPCIL as directed by Engineer.

7. MAINTENANCE OF CLEAN SITE CONDITIONS AND HOUSEKEEPING

During the execution of work the Contractor shall keep the entire site in neat and tidy conditions always by proper housekeeping and stacking of construction materials at site and by removing all debris and waste material regularly, on day to day basis if necessary.

Contractor shall arrange suitable portable metallic storage bins to store construction materials at site. No material shall be allowed to be spread at site directly on roads / floors. All the garbage and waste material shall be disposed off regularly at the designated area as specified by the Engineer. The curing water shall be constantly removed from various floors by adopting temporary dewatering scheme in the buildings and maintain the site in hygienic condition.

Accumulation and piling of construction materials /debris/ tool boxes will not be permitted except only at the locations approved for this purpose. Special care shall be taken to prevent spread of concrete, curing water and construction material, etc to other areas where plant equipment is already placed.

Bidder may refer to section III-B (Project safety requirements) for details related to house keeping.

7.1. CONTRACTOR'S CONSTRUCTION SITE OFFICE

Contractor's site office within the construction area for his engineers and labour shall be established using the standard Porta Cabins or containers and no site office shall be allowed inside the building. No make shift structures are permitted. The facilities to be built by the

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contractor shall be aesthetically pleasing and shall match with the general surrounding of KKNPP.

7.2. OTHER REQUIREMENTS

It is also essential that contractor keeps all his moving machinery viz. vehicles; transit mixers, dumpers etc. in neat and clean condition and to achieve this contractor shall keep suitable arrangement for washing at his own cost.

Smoking, chewing of tobacco/pan etc is not permitted in the township premises, Hence the contractor shall instruct his labours & staff and ensure that these are not brought into the site. Identity card/Entry pass of any person found indulging in any such activities will be confiscated and will be removed from site without any explanations.

7.3. TOILET FACILITY AT WORK SITE

Contractor shall establish toilet facility comprising of urinals and IWCs within the construction site along with water supply arrangements, disposal of waste, lighting, ventilation, washing facility, drainage arrangement, cleaning facility, etc., and shall maintain them in clean condition at all times by deploying suitable persons.

In addition, Contractor shall establish mobile toilet facility along with all the requisite facilities and disposal means at various locations within the site. All these aspects shall be considered while quoting. No separate payment will be made to the contractor by NPCIL.

7.4. LUNCH SHEDS/REST ROOM FACILITY FOR WORKERS

Consuming of eatables/Lunch in the work locations is not permitted. Contractor shall construct suitable lunch sheds/Rest Room for taking of food by his workers. Proper water, sanitation and waste disposal facility shall be provided at these lunch sheds. The location of these sheds shall be jointly decided with the Engineer.

Note: All these aspects shall be considered while quoting. No separate payment will be made to the contractor for providing the site toilet facility/lunch sheds to his workmen; and this cost shall be deemed to be included in the quoted rates of the contractor. Contractor has to keep suitable persons for day to day maintenance/house keeping of the area and its surroundings.

8. ROYALTY

The rates quoted by contractor shall be inclusive of royalty for materials used for works like rock, soil, coarse aggregate, fine aggregate etc as levied by the local/state govt. / other statutory bodies as applicable to this contract.

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All the statutory requirement shall be fulfilled as per the prevailing norms and the cost towards same are deemed to be considered in the quoted rates.

9. STAFF AND LABOUR CAMP

NPCIL will not provide any land for establishment of staff and labour camp. Contractor has to make his own arrangement for staff and labour camps outside the premises of KKNPP Township. All these aspects shall be considered and should be included in the quote and no separate payment will be made to the contractor for staff and labour camp.

10. WATER SUPPLY

NPCIL will not be able to supply water at to the contractor. The Contractor shall make his own arrangements to meet the desired quality and quantity of construction water demand at his own cost. He shall lay and maintain water supply lines to his construction site. He has to construct suitable storage tanks to meet at least four day's water requirement at site.

11. CONTRACTOR BATCHING PLANT AND ROCK CRUSHERS.

Concrete production batching plants and aggregate crushing plants ***will not be permitted*** to install within KKNPP township premises. Contractor has to make necessary arrangement for establishing the batching plants and aggregate crushing plant outside the premises of KKNPP Township and concrete shall be transported to site using transit mixtures. Contractor shall submit the detailed plan for the same with details of capacity of batching plant and transportation arrangements for approval of the engineer.

12. DUST CONTROL MEASURES AT SITE

The sources of dust generation are to be provided with adequate arrangement (such as water sprinkling, de-dusting unit, etc.) to achieve a clean working environment.

Following are the main sources of dust:

- Emissions during loading and unloading of stones/crushed products
- Emissions during material movement and transfer
- Emissions during transportation
- Secondary Emissions from stockpiles

The water sprays/de-dusting unit shall be located as close to the points of emissions as possible such that the dust is suppressed at the source itself.

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13. CONTRACTOR'S SITE ORGANISATION

The Bidder shall furnish along with the tender a indicative site organization he proposes to deploy on the works. The organization shall indicate the number and category of personnel of different grades for supervisory works.(The distribution of staff and personnel shall be area wise/schedule wise/activity wise.)

14. CONSTRUCTION METHODOLOGY

Contractor shall prepare and submit a detailed construction methodology and work procedures before start of each construction activity for approval.

15. PAYMENT OF EXTRA ITEMS / DERIVATION OF RATES

The rates for altered, extra or substituted item of work shall be worked out in accordance with Clause 11.2.5 of the General condition contract. A component of overheads and profit @ 15% will be considered for deriving new rates for extra, altered, and substituted items. The contractor, when called for by NPCIL, shall furnish detailed analysis in support of the rates quoted by him against items of the tender. NPCIL reserves the right to utilize the analysis thus supplied in setting any deviations or claims arising on this contract.

16. SECURED ADVANCES

Non-interest bearing Secured advance for the materials brought to site may be released to the contractor. The material for which advance shall be paid is as listed below:

Sl.No.	Materials
1.0	Reinforcement steel
2.0	Structural steel

17. ELECTRIC POWER SUPPLY FOR CONSTRUCTION PURPOSE

Construction power supply required by the contractor can be availed by them from NPCIL's substation as and when the same is available at site as per the NPCIL's terms and conditions. -

The Bidder shall furnish along with the tender, the estimated requirement of construction area wise electrical power at plant site, and the labour camp separately for the execution of the work in items of maximum KVA demand and also the daily energy consumption in KVA.

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Non-availability of regular power supply shall not be a reason for delay in execution of the contract and/or any extra payment on this account. The necessary cabling from the NPCIL substation to contractor work site shall be laid by the contractor. NPCIL shall meter the supply of power to the contractor at the points at which the supply is given. For this purpose, electronic energy meter capable of recording KVA, KWh & maximum demand shall be installed by the contractor on the distribution panel. It would be the contractor's responsibility to ensure the safety of the meter and to ensure protection so that the meter is not tampered with.

18. CONFIDENTIALITY

The Contractor, his employees and agents shall not disclose any information or drawings furnished to him by the project. Any drawings, reports and other information prepared by the Contractor/by project or jointly by both for the execution of the contract shall not be disclosed and no photographs of the works or plant within the site premises shall be taken without the prior approval of the Engineer.

19. MEASURES FOR PROTECTION OF ENVIRONMENT DURING CONSTRUCTION

The contractor shall comply with all the conditions laid down by the local pollution control authority, Ministry of Environment & Forest and other agencies. The contractor shall not carry out any activity contravening their requirements and guidelines.

Cutting of trees is to be avoided to the maximum extent. In case this is unavoidable, the contractor shall obtain approval from the Engineer for the cutting of trees.

20. PRESENTATION BY SUCCESSFUL BIDDER / KICK-OFF MEETING

On award of work, the contractor is required to make a detailed presentation during the kick off meeting. The presentation shall include all the points relevant to execution of this contract, relevant submission of the same for approval by NPCIL and Regulatory Authorities. These are:

- Construction Methodology
- Plant and machinery
- QA System
- Safety System
- Plant and camp infrastructure
- Site organization
- Resource management

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- Import of labour, materials and equipment
- Training
- Equipment erection / movement plan at site to carry out the job
- Planning and documentation system
- Communication system

SECTION III-A
UNCONDITIONAL UNDERTAKING

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SECTION – III-A

Undertaking / Confirmation / Acceptance by bidder

Bidders are required to confirm the following failing which, their bid shall be considered incomplete and shall be summarily rejected.

- 1.1 We hereby confirm that the work under subject tender shall be executed in the desired time schedule.
- 1.2 We agree to augment all types of resources to meet the agreed time schedule and the details of the same shall be worked out and submitted to NPCIL for acceptance.
- 1.3 Our bid is hereby submitted unconditionally, accepting NPCIL's all "terms and conditions" stipulated in the subject tender.
- 1.4 I/ We certify that this bid document is as issued by the Corporation/ downloaded from website & is submitted without any change. In case it is found at any time during bidding or during execution that, this tender document submitted by us, is in variance with the original, for undue advantage/ benefit, we shall be legally held responsible for the same. In addition, our offer shall be summarily rejected or terminated if awarded, forfeiting of Earnest Money Deposit , Bank Guarantee, Security Deposit, if any etc., and necessary action can be taken to the extent of blacklisting for further works in NPCIL

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GENERAL SAFETY GUIDE

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PART-A
CONTROL OF WORKS
(FACILITIES)

1. INTRODUCTION

1.1 General

Department of Atomic Energy (DAE) through its constituent units execute various site works either by their own manpower or by manpower of various outside agencies. The nature of contracts with outside agencies can be works contracts, engineering procurement contracts, minor fabrication contracts etc. These site works involve entire gamut of conventional industrial activities like excavation, rock blasting, earth handling, construction, material handling, fabrication, installation, operation, maintenance etc. of nuclear or conventional plants/facilities. This is a challenging responsibility for the facility due to the complexity of problems like quality of workforce (which may be unskilled, illiterate, migratory) available for labor-intensive jobs, lack of coordination among agencies at site, lack of safety awareness among concerned authorities, time schedules of project etc. As primary employer of the workforce (facility or contractor) at site, it is the responsibility of the facility management to ensure health and safety of personnel engaged for the work. Any accidental injury or loss of life is detrimental to the facility as well as the society. This 'guidelines' covers the safety organisation and the safety management system requirements in sections two and three. The work specific safety precautions are covered in section four. The requirements relating to personal protective equipment and medical management are covered in sections five and six.

1.2 Objective

This 'guidelines' has a basic framework of industrial safety organisation, safety management systems, safe work procedures to maintain a safe working environment for all personnel and to prevent any unsafe condition/act endangering the life of personnel engaged for industrial activities. The major objectives of this 'guidelines' are:

- (i) To create awareness among workers about industrial hazards and safe working procedures.
- (ii) To lay down safe work procedures and systems to be followed for different type of industrial activities
- (iii) To establish a robust safety management system.
- (iv) To protect the health and ensure the safety of the workers from industrial activities.

1.3 Scope

This 'guidelines' is essential for implementation and assurance of conventional safety in areas such as industrial, chemical, electrical, fire, environmental and is applicable for all works taken up by the facility as well as contracted works like engineering procurement contract, minor fabrication contract etc. Where the execution of work is envisaged in radiation controlled area or involves handling and fabrication of any nuclear material, additional precautions noted in relevant AERB safety documents on radiation protection shall also be applicable.

2. SAFETY ORGANISATION

2.1 General

- (a) Construction projects have significant health and safety hazards, which need to be managed systematically since the project inception stage to achieve adverse incident free completion. A well-defined safety organisation helps in effective implementation of safety management systems and ensures health and safety of workers.
- (b) The safety organisation should assure the management that all the provisions of relevant Acts and Rules are conformed to.
- (c) Safety organisation should comply with all the requirements such as safety surveillance, safety training, safety enforcement measures, safety audit etc. related to all works to fulfill the overall safety requirements of this 'guidelines'.
- (d) Safety functionaries should be exclusively assigned with the work related to protection of health and safety of workers.
- (e) Safety organisation should directly report to the Project Director / Project Manager.
- (f) IS: 18001: 2007 gives detailed requirements of health and safety management system requirements. IS: 15793 gives requirements of good practices for managing environment, occupational health and safety legal compliance. This 'guidelines' prescribes requirements in addition to IS: 18001: 2007 and IS: 15793 and gives guidelines on implementing these specific to a construction project.
- (g) The requirements prescribed in various central and state regulations including *Building and other Construction Workers (Regulation of Employment and Conditions of Service) Act, 1996* and rules framed thereunder with respect to managing health and safety in construction projects, shall be complied with.

2.2 Organisational Structure for Safety Management

- (a) Organisational structure depends on the construction project. As an example, a typical organisational chart for safety management in a construction project would be as given in Fig 1.

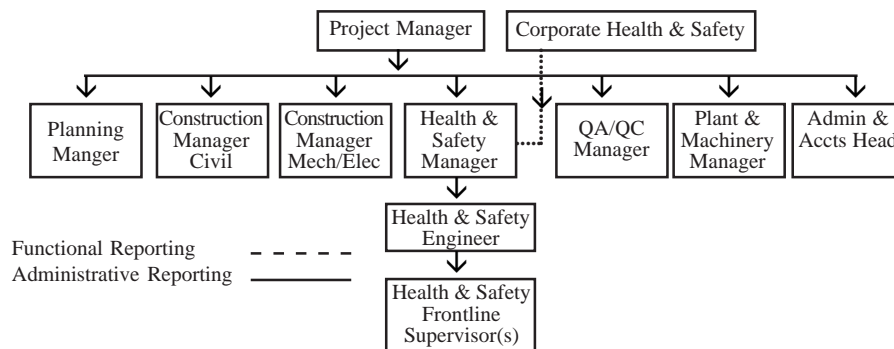


Fig -1 : Typical Organisation Chart

- (b) The organisational structure for Health and Safety will vary from project to project. On large and medium projects, it may be necessary to have a separate safety team for each sub-contractor who in turn shall report to safety team of the main construction agency.
- (c) The qualification, experience and the minimum number of safety professionals to be deployed should be as per the following table:

TABLE-1 : QUALIFICATION, EXPERIENCE & NUMBER OF SAFETY PROFESSIONALS FOR CONSTRUCTION PROJECTS

Category of safety person	Mandatory requirement	Qualification
Head, industrial safety	One at each site/unit	Degree in engineering/technology and diploma in industrial safety with minimum three years of experience
Safety officer	One in each shift (minimum) up to 1000 workers. If number of workers in a shift (including contractor's workers) exceeds 1000, additionally one safety officer should be deployed for every 1000 workers or part thereof.	Degree in engineering/technology and diploma in industrial safety with minimum two years of experience or Diploma in engineering with diploma in industrial safety with minimum 6 years experience or A recognised degree in physics or chemistry and has practical experience of working in a factory in a supervisory capacity for a period of not less than 5 years.

Category of safety person	Mandatory requirement	Qualification
		<p>Notwithstanding the provision contained in the above criteria any person who (i) possesses a recognised degree or diploma in engineering or technology and has had experience of not less than five years in a department of the central or state government which deals with the administration of the Factories Act, 1948 or the Dock Workers (safety, health and welfare) Act, 1986 (54 of 1986) or (ii) Possesses a recognised degree or diploma in engineering or technology and has had experience of not less than 5 years, fulltime on training, education, consultancy, or research in the field of accident prevention in industry or in any institution, shall also be eligible for appointment as a safety officer:</p> <p>Provided that competent authority may, subject to such condition as it may specify, grant exemption from the requirement of this sub rule if in its opinion, a suitable person possessing the necessary qualification and experience is not available for appointment.</p>
Safety supervisor	<p>One in each shift (minimum) up to 500 workers.</p> <p>If number of persons working in a shift (including the contractors' workers) exceeds 500, additionally one safety supervisor should be deployed for every 500 workers or part thereof.</p>	<p>Diploma in engineering and diploma in industrial safety</p>

3. SAFETY MANAGEMENT

3.1 General

- (a) Pre-construction stage activities of the project shall be required to be reviewed before the project management processes are initiated for the construction stage. While the project documents and proposals are reviewed for the adequacy of health and safety measures, it is essential to ascertain timeframes and budgets relating to health and safety measures, including extent of management systems proposed to be employed during construction.
- (b) A concise safety management system of the facility shall be established from the pre-construction stage itself. The tender documents of the project shall clearly communicate the health and safety requirements of the project to the prospective contractors. These may include:
 - (i) Project specific objectives and targets
 - (ii) Project specific health and safety requirements (technical as well as management systems)
 - (iii) Requirement of posting safety officers
 - (iv) Coordination among owner/client, project manager, consultants and facility
 - (v) Welfare facilities at the project for workmen
 - (vi) Reward system for good health and safety performance
 - (vii) Penalty system for non-compliances, violation and adverse incidents
 - (viii) Health and safety monitoring measures
 - (ix) Health and safety reports to be submitted and frequency.
- (c) The construction agencies (contractors) should be asked to submit a project specific health and safety plan (construction safety management plan) proposing the methodology for managing health and safety and their capability in completing the project in a safe manner.
- (d) The proposed construction safety management plans of the construction agencies and their past health and safety performance shall be considered as one of the criteria during pre-qualification and selection of construction agencies.

3.2 Safety Policy

- (a) The facility and the construction agency jointly or separately shall have a written statement prescribing the health and safety policy of the organisation. The health and safety policy conveys the management commitment and intent of the organisation towards health and safety, its organisation and arrangements to ensure that the set objectives are met. It also provides a framework for establishing, maintaining and periodically reviewing health and safety objectives and targets.
- (b) Health and safety policy shall meet the requirements of *Building and other Construction Workers (Regulation of Employment and Conditions of Service) Act, 1996* and IS 18001.
- (c) The policy shall be communicated to all stakeholders through display and other means. The policy shall be displayed in local language(s) which may be understood by majority of the workmen.

3.3 Safety Plan

- (a) A project specific health and safety plan shall be developed by the facility. On approval by the project director, the project health and safety plan shall be reference document for implementation, control and monitoring of health and safety aspects of the project by the facility.
- (b) Project health and safety plan shall describe how the project specific health and safety objectives and targets shall be achieved. It shall define the road map for achieving the standards that an organisation lays down for itself so that efforts can be coordinated, synergised and monitored.
- (c) Health and safety plan shall explain the means of establishing a positive health and safety culture at the project site. Health and safety plan shall identify and enumerate the control measures to mitigate the risks to the project completion arising out of health and safety issues so that the project is allowed to proceed without interruption and executed as per schedule.

Salient aspects that may be covered in the project health and safety plan are:

- (i) Project specific health and safety objectives, targets and programmes in line with health and safety policy
- (ii) Hazard identification and risk assessment
- (iii) Meeting legal and other requirements

- (iv) Health and safety organisation
 - (v) Resources, roles, responsibility and authority
 - (vi) General health and safety rules
 - (vii) Health and safety requirements to be followed by sub-contractors
 - (viii) Operation control procedure
 - (ix) Activities requiring work permit system and its procedure
 - (x) Safe handling of chemicals, explosives, gas cylinders, electrical equipment etc.
 - (xi) Access control of employees
 - (xii) Safety of visitors
 - (xiii) Management of critical activities such as work at height, material handling and working with plant and machinery
 - (xiv) Ensuring the competency and awareness of the workmen
 - (xv) Fire prevention and fire fighting plan
 - (xvi) Emergency preparedness and response plan
 - (xvii) Traffic management plan
 - (xviii) Training matrix
 - (xix) Personal protective equipment matrix
 - (xx) Health and safety performance monitoring measures such as inspection and audit
 - (xxi) Incident reporting and investigation procedure
 - (xxii) Proactive and reactive indicators of health and safety
 - (xxiii) Reward and reprimand for health and safety performance
 - (xxiv) Checklist and formats
 - (xxv) Health monitoring plan for employees/workers exposed to hazardous job.
- (d) The risk control measures identified shall meet the provisions of *Building and other Construction Workers (Regulation of Employment and Conditions of Service) Act, 1996*, other legislations and provisions of various safety related standards.
- (e) Procedures shall be established for timely recording and reporting of information required for continual improvement of health and safety performance. Internal reporting procedures shall cover:

- (i) Incident reporting
- (ii) Non-conformance reporting
- (iii) Health and safety performance reporting
- (iv) Hazard identification reporting

External reporting shall cover

- (i) Statutory reporting requirements

The recording of reporting of health and safety performance shall be clearly documented in the project health and safety plan.

3.4 Roles, Responsibility and Authority

- (a) Project manager shall define, document and communicate the roles, responsibilities and authorities of all personnel who manage, perform and verify activities having an effect on health and safety risks. It shall also include contractors and visitors.
- (b) Ultimate responsibility for health and safety shall rest with top management of the respective organisation.
- (c) The line management personnel who are responsible for execution of activities are directly responsible for health and safety in the work under their control.
- (d) Health and safety group and health and safety officers are responsible for guiding the top management on health and safety issues and facilitating the implementation of health and safety in the project site. For duties and responsibilities of health and safety officers refer Atomic Energy (Factories) Rules-1996.
- (e) Health and safety officers shall administratively report to the project manager and functionally report to the senior health and safety representative of the organisation.
- (f) Health and safety officers and health and safety group shall be empowered by the project manager for stopping any unsafe practices which are of imminent danger to employees. Health and safety group shall directly report to no less than the head of the project.
- (g) Health and safety supervisors shall be engaged to assist the health and safety officers in performing their duties.
- (h) Management shall provide adequate resources essential to effectively manage the health and safety requirements of the project. The resources shall include human resources, organisational infrastructure, technology and financial resources.

3.5 Design and Engineering

- (a) Design drawings, construction methodology and plans shall be reviewed to determine whether any additional risks may arise during the construction due to the features in the design or methodology.

Attention shall be paid to:

- (i) Providing permanent hooks and loops for tying safety slings of workers
 - (ii) Providing holes or such arrangements to the structure to which safe working platforms and safety nets can be connected
 - (iii) Significant risks from construction materials, which cannot be avoided in the design
 - (iv) Laying permanent slings, grab rails/bars to be used by the workers
 - (v) Permanent provision for attaching railings
 - (vi) Provision for alternative access to the trapped or distressed workers
 - (vii) Provision for communication
 - (viii) Design facilitating barricading of the area around work site without causing hindrance to building functional activities
 - (ix) Durability of such safety related permanent design integrated elements
 - (x) Other safety practices required for the type of works involved.
- (b) Analysis of design and integration of safety measures, as described above, should be undertaken as value engineering through multi-stakeholder consultation, necessarily involving designers, owner/client, operation/maintenance management and construction agency.
- (c) While need for special work methodology and enabling infrastructure is considered to make conditions safe for construction, attention shall also be drawn to the safety during maintenance operations (including inspections which may be necessary before project commissioning as well as maintenance).
- (d) It shall also be ascertained whether it would be feasible (within the time and cost considerations) to erect necessary temporary enabling infrastructure. If, in the due assessment by the project manager, it is established that the design, as proposed, would continue to be unsafe during construction and maintenance operations unless special

enabling infrastructure is created and work procedures specifically drawn, the design shall be reviewed.

3.6 Construction Planning

- (a) Prior to the start of construction work, detailed planning shall be carried out which may include:
 - (i) Identifying aspects of design that have bearing on health and safety during construction stage.
 - (ii) While scheduling the various activities of the construction, allowing adequate time to carry work in accordance with health and safety requirements.
 - (iii) Reviewing the proposed work method of various activities, identifying health and safety hazards of activities in the project and assessment of the risk level.
 - (iv) When the risk level is unacceptable, taking additional control measures including revision of the work methodology so that identified risk is at ALARP (as low as reasonably practicable) level.
 - (v) Planning and establishing the facilities for implementation of health and safety such as workmen training facility, health centre for medical check-up and first aid, access control of employees, etc.
 - (vi) Ensuring that the temporary establishments at project site such as site offices, workmen camps, toilets, canteens and rest sheds, etc. are created meeting the requirements of the relevant statutes and standards.
- (b) Facility shall ensure that the construction agency has understood the challenges and has planned to meet the project specific health and safety requirement through appropriate competencies.
- (c) Health and safety measures need proper coordination by the construction agency and such efforts of the construction agency shall be reviewed, monitored and appropriately guided by the facility.
- (d) In respect of sub-contractors, project manager of the construction agency shall ensure that the sub-contractors meet the health and safety requirements of the project. Health and safety control and monitoring shall be established specific to the needs of the project.
- (e) Past health and safety performance and capability of contractors to complete the job safely shall be given due consideration during selection of contractors. The project specific health and safety

requirements shall be clearly communicated to the contractors and a commitment obtained from them on meeting the requirements.

3.7 Safety Communication

- (a) Procedures shall be established to communicate significant hazards and risks to and from employees and other interested parties. The health and safety hazards and risks may be communicated in the following ways:
 - (i) Sharing of accidents case studies which occurred in the project site as well in other similar projects
 - (ii) Health and safety posters and displays
 - (iii) Health and safety campaigns and competition involving the employees
 - (iv) Sharing of results of the audits, inspections and other monitoring systems
 - (v) Establishing a system for collecting feedback on health and safety from employees and other interested parties
 - (vi) Tool box meeting
 - (vii) Safety signage.
- (b) Health and safety communications addressed to workmen shall preferably be in local language(s) understandable by majority of the workmen.
- (c) The owner/client, consultant and construction agency shall jointly endeavour to promote a positive health and safety culture at the project. Top management of the organisations should exhibit a visible management commitment and felt leadership towards health and safety. This shall be achieved by participating in health and safety programmes such as,
 - (i) Project health and safety committee meeting
 - (ii) Health and safety walk down
 - (iii) Including health and safety in all performance review meetings
 - (iv) Exhibiting a safe behaviour while at site.
- (d) The top management should clearly communicate that it considers safety as core value and it shall not allow it to get compromised. Such messages when it reaches down the level in the organisation enable to create a positive health and safety culture.

3.8 Safety Monitoring Programme

- (a) The objective of the safety surveillance programme should address assurance of effective implementation of safety measures in execution of works. Following surveillance programme should be in place at sites. The safety organisation should monitor, maintain record and follow up for corrective actions.
- (b) The surveillance programme should consist of identification of safety related deficiencies and status of corrections thereof, the implementation of protective measures, the safe work practices, human behavior etc.
- (c) Specific surveillance should be ensured with respect to testing of equipment, portable power tools, electrical equipment and tools, hand tools, surveillance of material handling equipment, transport equipment, earth moving equipment, gas cylinders etc. to comply with various statutory requirements.
- (d) Surveillance on safety awareness and training compliance including induction training, on the job training and refresher training, job specific pre-job briefing, job hazard analysis, etc. as per facility's guidelines should be ensured.
- (e) Safety related deficiencies should be detected by any employee of the facility and communicated by the safety officer to their line managers with a record and corrective measures monitored and recorded. The engineer-in-charge should specifically ensure this. These should be informed to Head, Industrial Safety within the stipulated time period as per the category of safety related deficiencies (SRDs).
- (f) Systematic record of safety related deficiencies (SRDs) attended and pending should be made by the facility and other executing agencies.
- (g) Head, Industrial Safety should verify periodically, at least once in 15 days that all safety related work permits issued are executed and recorded.
- (h) The health and safety performance monitoring and measurement procedures shall provide for:
 - (i) Both qualitative and quantitative measures appropriate to the project
 - (ii) Monitoring the extent to which project health and safety objectives are met

- (iii) Proactive measures of compliance that measures compliance with health and safety plan, operational control procedures and legislation
 - (iv) Reactive measures of performance to monitor accidents, ill health, near misses and non-conformances
 - (v) Monitoring dangerous occurrences
 - (vi) Fire occurrences
 - (vii) First aid injuries.
- (i) Health and safety audit is a systematic and independent examination to estimate if planned arrangements and activities are effectively fulfilling organisation's health and safety policy, plan and objectives. Its purpose is to find out:
- (i) Whether the organisation has adequate procedures for identifying specific health and safety requirements
 - (ii) Whether such laid down procedures are followed and specific health and safety responsibilities are understood
 - (iii) Whether health and safety policies and risk assessment procedures identify the measures needed to avoid risks to employees and other interested parties
 - (iv) Whether the company has adequate procedures for devising, reviewing its health and safety standards
 - (v) Whether the company's health and safety standard identifies measurable targets
 - (vi) Whether the company has established adequate procedures for planning, implementing, controlling, monitoring and reviewing the health and safety measures.
- (j) Project health and safety management audits provide the method for monitoring and controlling health and safety activities and procedures throughout the life of the project. Audits can be internal or external. Internal audit can be conducted by the persons from the same organisation who are not directly connected with the work site to be audited. The external audits are performed through external professional experts.
- (k) Health and safety inspections shall be preferably conducted by a team of the concerned engineer, health and safety officer and area in-charge. Project manager and other senior personnel shall also join in some of the health and safety inspections.

- (l) The type of inspections that shall be carried out and the frequency shall be decided during the planning stage and documented in the project health and safety plan. The health and safety inspections should include:
 - (i) General site health and safety inspection
 - (ii) Electrical safety inspection
 - (iii) Plant and machinery inspection
 - (iv) Health and hygiene inspection
 - (v) Scaffolding safety inspection
 - (vi) Portable tools and tackles
 - (vii) Lifting tools and tackles
 - (viii) Fire equipment inspection
 - (ix) Illumination level and noise level monitoring
- (m) Project health and safety committee shall be constituted with project manager as the chairman, health and safety head as the secretary and representatives from various groups including workmen representatives as the members. The constitution and functioning of the committee shall meet the provisions of *Building and other Construction Workers (Regulation of Employment and Conditions of Service) Act, 1996*.
- (n) This committee shall review the status of implementation of project health and safety plan, health and safety objectives and targets. Health and safety indicators and findings of the walk down by the committee members shall also be discussed and action plan derived.
- (o) Status of health and safety implementation shall be measured and monitored by several proactive indicators which include the following:
 - (i) Compliance level of project health and safety plan
 - (ii) Compliance level of health and safety observations with in the target date
 - (iii) Implementation status of training plan
 - (iv) Implementation status of corrective and preventive actions
 - (v) Compliance level of pre-employment medical checks and periodic medical checkups
 - (vi) Compliance level of legal and other requirements

- (vii) Percentage of activities for which detailed project specific risk assessment is conducted.
- (p) Procedures shall be established to report, investigate and analyze incidents. The procedures shall involve:
 - (i) Members of the incident investigation team
 - (ii) Agencies to be reported in case of incidents
 - (iii) Time period within which incidents need to be reported
 - (iv) Methodology for investigation and determining the root cause of accidents.

These procedures shall form a part of the project health and safety plan and monitored on a regular basis for its effectiveness.

- (q) All incidents including near miss cases, accidents and dangerous occurrences shall be thoroughly investigated, direct and root causes determined and corrective action planned. Incidents should be analysed covering the following ways to prepare and implement an effective prevention plan:
 - (i) Body part injured
 - (ii) Age of the victims
 - (iii) Time of accidents
 - (iv) Causes of accidents
 - (v) Nature of injury.

For detailed guidelines on analysis of incidents and computation of injury rate refer IS 3786.

- (r) The following reactive health and safety indicators should be used to measure and monitor the health and safety performance of the project site:
 - (i) Number of near miss cases
 - (ii) Number of first aid cases
 - (iii) Lost time injury frequency rate
 - (iv) Lost time injury severity rate.
- (s) The health and safety performance of contractors shall be monitored on a regular basis and necessary directive and support shall be given to achieve the set health and safety objectives and targets.

- (t) All accidents leading to property damage/fatal accidents/personnel injuries/near miss and dangerous occurrence should be reported to the engineer-in-charge immediately.
- (u) All 'near-miss' accidents should also be recorded/reported and investigated and recommendations arising out should be implemented on priority.
- (v) Facility/Contractor should also submit a monthly statement of accidents to engineer-in-charge/head, industrial safety by 4th of the following month showing details of accident, nature of injury including disability, days lost, treatment required, etc. and the extent of property damage.

3.9 Training/Orientation

- (a) It shall be ensured that all employees are competent to perform the assigned work safely on the basis of appropriate education, training or experience. The competency requirements of different categories of employees shall be mapped and procedures shall be implemented to ensure that those deployed meet the competence requirements.
- (b) Training needs of the different category of employees shall be identified at the beginning of the project and a training matrix and plan shall be prepared for implementation.
- (c) The objective of health and safety training shall be to equip the employee with necessary knowledge and skill to perform the work assigned to him in a safe manner, to foster continual improvement and to imbibe safety culture.
- (d) Preferably, the training should be carried out away from the working place of the participants to ensure focused attention on the training for both trainer as well as trainees.
- (e) After completion of training due procedure shall be followed for obtaining the feedback from the participants on the effectiveness of the training. Effectiveness of training imparted shall be monitored for continual improvement and necessary corrections in implementation.
- (f) The training/orientation programme should be implemented to meet the mandatory requirements. [Rule 43(2) (m) of the Atomic Energy (Factories) Rules 1996]. The training should be phased as follows:
- (g) Induction cum orientation training should include the overall safety aspects of the work and give a general overview of the various hazards, the particular activities and the do's and don'ts. As a part of training, workers should also be given demonstrations on use of

personal protective equipment, first aid, fire-fighting equipment, fire mock drills, other emergency preparedness etc.

- (h) The line manager along with the safety representative should conduct pre-job briefing on day-to-day basis prior to specific hazardous jobs. This will make the workers aware of the hazards and the precautions to be taken.
- (i) Refresher training should be imparted to each worker at least once in a year.
- (j) A training schedule should be prepared by the facility for implementation.
- (k) Records of training, demonstration and pep talk should be maintained.

3.10 Permit to Work System

- (a) Activities requiring permit to work shall be decided before starting the construction and shall be suitably documented in the project health and safety plan. Some of the activities which should require permit to work are:
 - (i) Excavation
 - (ii) Entry into confined spaces
 - (iii) Electrical work (HV/LV)
 - (iv) Opening manholes, covers and grills
 - (v) Blasting operation
 - (vi) Hot work
 - (vii) Work on plant and machinery & other power driven equipment
 - (viii) Working at height
 - (ix) Working at night
- (b) The facility should establish a permit to work system for any other hazardous activity, which it feels necessary to be controlled administratively for safe execution.
- (c) Record of safety work permit should be maintained in a systematic manner. All the safety conditions and requirements stipulated in the safety work permit should be ensured strictly.
- (d) Occupier should ensure that only authorized personnel are deployed for hazardous works/jobs (Refer item 3.11 for hazardous job) and provide facilities for the same.

3.11 Job Hazard Analysis

- (a) It should be ensured that a safe work procedure exists for all the hazardous jobs as mentioned hereunder and the requirements of the safety procedures are ensured at the work sites. Job hazard analysis (JHA) should form a part of such safe work procedures. A checklist based on JHA should be prepared. This checklist should be crosschecked by the line managers and verified by safety officer.

Typical list of jobs requiring job hazard analysis (this list is illustrative only and not exhaustive) is as follows:

- (i) Excavation
 - (a) Blasting including under water blasting
 - (b) Earth and stone removal/backfilling/dumping of earth/stones
 - (c) Any excavation more than 1.8 m depth.
- (ii) Work at height (working beyond 3.5 meters above ground)
 - (a) Erection and dismantling of scaffolding, platforms, shuttering/de-shuttering work
 - (b) Dome work, rod bending, construction of chimney and cooling towers
 - (c) Working on tower crane.
- (iii) Materials and material handling
 - (A) Critical equipment handling e.g.
 - (a) Calandria
 - (b) Steam generators
 - (c) Turbine generator components
 - (d) Diesel generator set
 - (e) Generator stator
 - (f) End shields
 - (g) Fuelling machines components
 - (h) Heat transport pumps etc.
 - (B) Hazardous chemical handling e.g.
 - (a) Acids and alkalis
 - (b) Chlorine

- (c) Hydrazine
 - (d) Morpholine
 - (e) Freon
 - (f) Ammonia
 - (g) LPG
- (C) Movement of heavy material by crane
- (D) Movement of tractor trolley on slopes
- (E) Manual lifting of heavy material to height
- (F) Erection of heavy machinery, equipment.
- (iv) Electrical connection
 - (a) Field connection for electrical installation
 - (b) Installation of lighting fixtures
 - (c) Charging of electrical system
 - (i) Charging of transformer, switch yard, switch gears
 - (ii) Working near high voltage lines
 - (iii) Use of portable electrical tools.
- (v) Equipment/structural erection work
 - (a) Material handling
 - (b) Loading and unloading
 - (c) Transportation of material from one place to other
 - (d) Steel fabrication and erection
 - (e) Cleaning and maintenance of batching plant equipment.
- (vi) Finishing/painting work
 - (a) Painting at height
 - (b) Painting in confined space.
- (vii) Other specific work
 - (a) Work with pneumatic tools/compressed air
 - (b) Work on pressure vessels/lines
 - (c) Work in the vicinity of steam lines
 - (d) Work in high enthalpy area

- (e) Work in high noise area
- (f) Work in confined space including tunnels & trenches
- (g) Work in isolated area (away from main site)
- (h) Radiography work
- (i) Work related to welding, gas cutting, grinding
- (j) Working near conveyor, rotating machine
- (k) Leak detection testing.

3.12 Reward and Reprimand

- (a) It is important to acknowledge and encourage good health and safety performance and suitably reprimand repeated violations, non-conformances and poor health and safety performances. Project specific reward and reprimand system shall be prepared as a part of the project health and safety plan.
- (b) To motivate the employees and organisation to work safely measures can be implemented based on the suitability. Selection and rewarding for the following categories may be considered on regular basis:
 - (i) Safest workmen
 - (ii) Safest supervisor
 - (iii) Safest area
 - (iv) Safest contractor, etc.
 - (v) Contractors and employees may be rewarded when the project achieves significant million man-hours without any lost time injury.
- (c) Unsatisfactory health and safety performance in the form of repeated violations, frequent adverse incidents and accidents shall be dealt with firmly. Depending on the seriousness of the violation the following options shall be considered:
 - (i) Issue of violation memorandum and obtaining written commitment for safe working
 - (ii) Suspension or termination of the employee from the present work
 - (iii) Suspension or termination of contract in case of construction agency
 - (iv) Imposition of penalty to the construction agency.

- (d) When penalties are imposed due records shall be maintained in a transparent manner. The main contractor shall be responsible wherever he deploys sub-contractor/petty contractor/piece rate contractor. The funds thus accrued may be spent in the form of rewarding employees for their sincere efforts towards improving the health and safety performance.

4. WORK SPECIFIC SAFETY SAFETY MEASURES

4.1 General

- (a) The occupier should ensure that safety precautions are taken during the execution of awarded work and work areas are maintained safe at all times. At the end of each shift and at all times when the work is suspended, it should be ensured that the work area is left safe in such a way that no materials and equipment that can cause damage to existing property, personal injury or interfere with the other works of the project or station are left in an unsafe manner.
- (b) The occupier should ensure to provide and maintain all lights, guards, fencing, warning signs, caution boards and other safety measures and provide for vigilance as and when necessary for the protection of workers and for the safety of others. The caution boards should also have appropriate symbols.
- (c) Adequate lighting facilities such as floodlights, hand lights and area lighting should be provided at the site of work, storage area of materials and equipment and temporary access roads within the working area.
- (d) All works should be planned so as to avoid interference with other facilities, works of other contractors or sub-contractors at the site. In case of any interference, necessary coordination should be ensured for safe and smooth working.
- (e) It should be ensured that the instructions given by the safety officer or his designated nominee regarding safety precautions, protective measures, housekeeping requirements, etc. are complied with. The safety officer with due intimation to engineer-in-charge should have the right to stop the work, if in his opinion, proceeding with the work will lead to an unsafe and dangerous condition. Engineer-in-charge should arrange to get the unsafe condition rectified and/ or provide appropriate protective equipment.
- (f) Engineer-in-charge should ensure that each job with a hazard whether small or big is intimated to the safety officer of the facility well before it is taken up.
- (g) The facility should be fully responsible for non-compliance of any of the safety measures or requirements, implications, injuries, fatalities, dangerous occurrences and compensation arising out of such situations or incidents.

- (h) Maximum duty hours of an individual should be as per the Factories Act 1948 or its latest amendment.
- (i) Illumination levels should be as per the statutory requirements.

4.2 Rock Blasting

- (a) All blasting operations should be carried out on the basis of procedures approved by Head, industrial safety and engineer-in-charge. All works in this connection should be carried out as per BIS specification/code (IS 4081: 1986. Title:- Safety code for blasting and related drilling operations (First Revision)). Barricades, warning signs etc. should be placed on the roads/open area.
- (b) Blasting permit should be obtained from Head, industrial safety at least one day before the blasting operation and precautions mentioned there in shall be ensured by the engineer-in-charge before blasting operation.
- (c) The blaster should have a licence from competent authority under Explosive Rules, 1983 for blasting work. It should also be ensured that he knows about the risks involved.
- (d) Blasting should be done under the supervision of competent engineer/supervisor.
- (e) Blasting in the open site should only be carried out during fixed hours every day/fixed day in the week between sunrise and sunset. Residents of adjacent area should be informed in advance about the blasting schedule.
- (f) No blasting should be undertaken during thunderstorm.
- (g) Necessary precaution should be taken to ensure the stability/integrity/safety of the adjacent structure by limiting the peak particle velocity.
- (h) No loose material, such as tools, drilling equipment, etc. should be left on the surface to be blasted. Proper muffling arrangement of the blasting area should be ensured to avoid flying of blasted material.
- (i) Authorised blaster should personally ensure that all the personnel/equipment has been removed from the blasting area before the blasting operations.
- (j) Blasting area should be free of detonating gas, inflammable objects, sparking or damaged wiring system, stray currents and static electricity.
- (k) All electrical lines in blasting area should be de-energised.
- (l) Entry of unauthorised personnel should be prevented by displaying warning signs.

- (m) In case of misfire, no person should be allowed to approach the blasting site unless it is inspected and cleared by a competent engineer/supervisor.
- (n) Explosives and blasting material should be stored only in clean, dry, well-ventilated, suitably constructed bullet/ magazine which should be fire resistant and securely locked. Stock book should be kept accurate and maintained. Licence should be obtained for storage of explosive as per the Explosives Act, 1884.
- (o) Blasting caps, electric blasting caps or primers and detonators should not be stored in the same box, container or room with other explosives.
- (p) Precautions against lightening should be provided in accordance with Indian Electricity Rules, 1956 (amended in 2000).
- (q) The explosives should be transported in specially designed vehicles bearing a special sign or inscription entitled 'DANGER - EXPLOSIVES'. Also detonators separated from other explosive should be transported in a separate compartment.

4.3 Excavation, Trenching and Earth Removal

- (a) Before taking up excavation work, necessary permission should be obtained from the engineer-in-charge with reference to existing underground services.
- (b) The engineer-in-charge of the works should exercise full care to ensure that no damage is caused by him or his workmen, during the operation/excavation etc., to the existing water supply, sewerages, power or telecommunication lines or any other services or works. He should provide and erect before construction, substantial barricades, guardrails, and warning signs around the work area. He should also furnish, place and maintain adequate warning lights, display board, signals etc., as required.
- (c) All trenches 1.2 m or more in depth should at all times be supplied with at least one ladder for every 30 m along the trench. Ladders shall extend from bottom of the trench to at least 1 m above the surface of the ground.
- (d) The sides of the trench/pit in soil, which are 1.2 m or more in depth should be stepped back to give suitable slope (angle of repose) or securely held by timber bracing or appropriate shoring/support, to avoid the danger of soil slides from collapsing. The excavated material should not be placed within 1.5 m or half of the depth of the pit whichever is more from edges of the trench/pit. Cutting should be done from top to bottom. Under no circumstances mining or under-cutting should be done.

- (e) Workers should not be exposed to the danger of being buried by excavated material or collapse of shoring. Measures to prevent dislodgment of loose or unstable earth, rock or other material from falling into the excavation by proper shoring shall be ensured.
- (f) The stability and safety of the excavation, adjacent structures, services and other works should be ensured.
- (g) All excavated area should be fenced off by suitable railing and installation of caution board to warn the persons from slipping or/ falling into the excavation pit/ mound.
- (h) All excavated areas shall have an illumination level of at least 20 lux for night work and a red danger light shall be displayed at prominent place near the excavation site to warn approaching traffic and men.
- (i) For removal of earth from an earth mound/excavated heap a written permission should be obtained from the engineer-in-charge of the work. As far as practical, earth should be removed mechanically. Wherever manual removal of earth is involved, earth should be removed from the top by maintaining a slope equal to the angle of re-pose of the earth. Such work should be constantly supervised to ensure that no under-cutting is done and to ensure that no person is trapped.
- (j) Dumping of excavated soil should be done at a specified area under proper supervision with respect to signaling, illumination and safety clearance.
- (k) It should be ensured that at a construction site of a building or other construction work, every vehicle or earth moving equipment is equipped with a) silencers, b) tail lights, c) power and hand brakes, d) reversing alarm e) search light for forward and backward movement, which are required for the safe operation of such vehicle or earth moving equipment and f) the cab of the vehicle or earth moving equipment is kept at least one meter from the adjacent face of a ground being excavated. g) indicator etc.
- (l) It should be ensured that when a crane or shovel is traveling, the boom of such crane or shovel is in the direction of such travel and the bucket or scoop attached to such crane or shovel is raised and without load, except when it is traveling downhill.
- (m) Before loading or unloading power trucks or trailers attached to tractors, the brakes should be applied and if vehicle is on a sloping ground, the wheels should be blocked. Handcart should not be used for the transfer of construction/erection materials in the construction

area. However if the exigency demands urgent transfer of light materials a small handcart may be permitted with the prior approval of the engineer-in-charge.

- (n) It should be ensured that at a construction site of a building or other construction work:
 - (i) All transport or earth moving equipment and vehicles are inspected at least once in a week by responsible persons and in case any defect is noticed in such equipment or vehicle, it is immediately taken out of service.
 - (ii) Safe gangways are provided for to and fro movement of building workers engaged in loading and unloading of lorries, trucks, trailers and wagons.
 - (iii) All earth moving equipment, vehicles or other transport equipment be operated only by such persons who are adequately trained and possess such skills as required for safe operation of vehicles or other transport equipment.
 - (iv) Trucks and other equipment are not loaded beyond their safe carrying capacity, which should be clearly marked on such trucks and other equipment.
 - (v) No unauthorised person rides the transport equipment employed in such work.
- (o) It should be ensured at a construction site of a building or other construction work that:
 - (i) A shovel or an excavator whether operated by steam or electric or by internal combustion used for such work is constructed, installed, operated, tested and examined as required under any law for the time being in force and the relevant national standards.
 - (ii) Buckets or grabs of power shovels are propped to restrict the movement of such bucket or grabs while being repaired or while the teeth of such bucket or grabs are being changed.
- (p) It should be ensured at a construction site of a building or other construction work that:
 - (i) An operator of a bulldozer before leaving – applies the brakes, lowers the blade and ripper and puts the shift lever into neutral.
 - (ii) A bulldozer is parked on level ground at the close of the work.
 - (iii) The blade of a bulldozer is kept low when such bulldozer is moving uphill.

- (iv) Bulldozer blades are not used as brakes except in an emergency.
- (q) It should be ensured at a construction site of a building or other construction work that:
 - (i) A tractor and a scraper are joined safely at the time of its operation
 - (ii) The scraper bowls are propped while blades of such scraper are being replaced.
 - (iii) A scraper moving downhill is driven in low gear.
- (r) It should be ensured at a construction site of a building or other construction work that:
 - (i) Before a road roller is used on the ground, such ground is examined for its bearing capacity and general safety, especially at the edges of slopes such as embankments on such grounds.
 - (ii) A roller is not moved down hill with the engine out of gear.
- (s) Vehicle carrying excavated material should have proper cover over the driver's cabin.

4.4 Safe Means of Access/Platforms

- (a) Adequate safe means of access and exit should be provided for all work places, at all elevations.
- (b) Suitable scaffolds should be provided for workmen for all works that cannot be done safely from the ground, or from solid platform except such short duration work that can be done safely from ladders. Bamboo/wooden scaffolding should not be permitted.
- (c) Where the platform for working is more than 3.5 m above ground, the width of the platform should be minimum 1 m.
- (d) Ladder should be of rigid construction having sufficient strength for the intended loads. Wooden/bamboo/rope ladders should not be permitted. All ladders should be maintained in good condition. The ladders should be fixed to the ground or rigid platforms. An additional person should be engaged for holding the ladder, if ladder is not securely fixed. Ladder shall be extended from floor to at least one meter above the platform.
- (e) A portable ladder should be given an inclination not steeper than 1 in 4 (1 horizontal and 4 vertical). Ladders should not be used for climbing while carrying materials in hands. While climbing both the hands should be free.

- (f) Any working platform on scaffolding or staging more than 3.5 m above the ground or floor should have a guard rail attached, bolted, braced at least 1 m high above the floor or platform of such scaffolding or staging along with mid-rail.
- (g) The planks used for any working platform should not project beyond the end supports to a distance exceeding four times the thickness of the planks used. The planks should be rigidly fixed at both ends to prevent sliding, slipping or tilting. The thickness of the planks should be adequate to take load of men and materials and should not collapse. Plywood or packing wood should not be used as planks.
- (h) The guardrail should extend along the entire exposed length of the scaffolding with only such opening as may be necessary for the delivery of materials. Standard railing should have posts not more than 2 m apart and an intermediate rail halfway between the floor or platform of the scaffolding and the top rail. Such scaffolding or staging should be so fastened as to prevent it from swaying from the building or structure. Scaffolding and ladder should conform to IS 3696 (Part 1): 1987 and (Part II): 1996.
- (i) Working platforms of scaffolds should have toe boards at least 15 cm in height to prevent materials from falling down.
- (j) A sketch of the scaffolding proposed to be used should be prepared and approval by the engineer-in-charge obtained prior to start of erection of scaffolding. All scaffolds should be examined by engineer-in-charge before use.
- (k) Working platform, gangways and stairways should be so constructed that they should not sag unduly or unequally and if the height of the platform or gangway or stairway is more than 3.5 m above ground level or floor level. They should have adequate width for easy movement of persons and materials and should be suitably guarded.
- (l) No single portable ladder should be used for access to a height of more than 4.5 m. For ladders up to 3m in length the width between styles (side bars)/width in the ladder should in no case be less than 300 mm. For longer ladders this width should be increased by at least 20 mm for each additional meter of length. Step/rungs spacing should be uniform and should not exceed 300 mm. Portable ladder should be used only for access to work place. In case work place is higher than 4.5 meters, pre-fabricated steel staircase should be used.

4.5 Work at Height

- (a) Person to work at height should be medically fit and should have height pass issued by safety section. (Appendix A Part A, B and C). Safety training should be imparted before working at height.

- (b) Safety work-permit system for working at height should be obtained from industrial safety section.
- (c) At elevated places, secure access and foothold should be provided. Adequate and safe means of access and exit should be provided at all work places for all elevations. Means of access may be portable or fixed ladder, ramp or a stairway. The use of crosses, braces or framework, as a means of access to the working platform should not be permitted.
- (d) Linear movement at height should be reduced to minimum. In case of such movement provision for anchoring the safety belt should be made.
- (e) Where barricades cannot be installed, a safety net of adequate strength should be installed close to the level at which there is a danger of fall of personnel/fall of objects.
- (f) In case where 'work at height' is on asbestos roof, crawling board, roof ladder should be used to walk across the asbestos roof.

4.6 Electrical Safety

- (a) All electrical installations shall comply with the appropriate statutory requirements given below and shall be subject to approval of the electrical engineer and safety officer.
 - (i) The Electricity Act, 2003
 - (ii) The Indian Electricity Rules 1956 (as amended in 2000)
 - (iii) The National Electricity Code 2008
 - (iv) Atomic Energy (Factories) Rules, 1996
 - (v) Other relevant rules of statutory bodies and power supply authority
 - (vi) Relevant standards of BIS

In addition to the above statutory provisions, the clauses indicated in this document shall also be complied.

- (b) It shall be the responsibility of the user seeking temporary power supply to indicate in writing, if any of the clauses (requirements noted in above regulations and in this document) are conflicting with each other and for which the user cannot decide the course of action regarding safe installation, commissioning, operation, maintenance and decommissioning of the electrical installations.

- (c) The electrical engineer and safety officer of the facility providing temporary power supply shall interpret the concerned conflicting clauses and approve in writing the safe course of action.
- (d) The Application Form-1 (Form-1A, 1B and 1C) as mentioned in Appendix-B should be submitted by the user for getting the temporary power supply.
- (e) After installation of temporary electrical panels, wiring works by the user, certificates as per Form-1D (Appendix-B) should be submitted to the provider.
- (f) Certificate of safety officer and authorisation of electrical engineer for energisation of temporary power supply should be filled as per Form-1E (Appendix-B).

4.7 Material Handling and Lifting Machines and Tackles

- (a) It should be made compulsory to supervise jobs like lifting/placing/loading/unloading/carrying/transporting etc. of heavy material by qualified supervisor having knowledge about hazards involved and precautions to be taken for such job.
- (b) The line managers should ensure that the material handling equipment used is adequate to handle the load.
- (c) Manual pulling of heavy equipment and trolley loaded with heavy material is not to be permitted.
- (d) Stacking and handling of heavy materials should be done on a firm ground to prevent settlement.
- (e) No lifting machine and no chain, rope or lifting tackle, except a fiber rope or fiber rope sling, shall be taken into use in any factory for the first time in that factory unless it has been tested and all parts have been thoroughly examined by a competent person. A certificate of such a test and examination specifying the safe working load or loads and signed by the person making the test and the examination has been obtained and is kept available for inspection.
- (f) Use of lifting machines and tackles should conform to relevant BIS requirements [IS 13367 (Part 1): 1992 Reaffirmed 2003, IS 4573: 1982 (Reaffirmed 2000) and IS 13834 (Part 1): 1994 Reaffirmed 2003 etc. The accessories and the attachments, anchorages and supports etc. should be ensured in healthy conditions by regular inspections at defined frequencies.
- (g) Every rope used in hoisting or lowering materials or as a means of suspension should be of good quality and adequate strength and free

from any defect. This should be ensured by regular inspection as per IS 2762: 1982- Specification for wire rope slings and sling legs (first revision).

- (h) Every crane operator or lifting appliance operator should be authorised. No person under the age of 18 years should be in charge of any hoisting machine or give signal to an operator of such machine.
- (i) In case of every lifting machine (and of every chain, ring, hook, shackle, swivel and pulley block used in hoisting or as a means of suspension) the safe working load should be ascertained and clearly marked. In case of a lifting machine having a variable safe working load, each safe working load and the conditions under which it is applicable should be clearly indicated. No part of any machine should be loaded beyond the safe working load except for the purpose of testing. This should be approved by the engineer-in-charge and head, industrial safety.
- (j) In case of facilities machines, the safe working load should be notified by the engineer-in-charge. As regards the contractor's machines, the contractor should declare the safe working load of the machine to the engineer-in-charge whenever he brings any machinery to site of work and get it verified by the engineer-in-charge, supported by a valid test certificate by the competent person.
- (k) Thorough inspection and load testing of lifting machines and tackles should be done in the presence of competent person at least once in every 12 months and records of such inspections and testing should be maintained.
- (l) No mobile crane should be allowed to move under live high-tension power transmission line.
- (m) While lifting loads, cranes should be located on level ground.
- (n) A thorough load analysis should be carried out before using cranes in tandem.
- (o) Motors, gear transmission, couplings, belts, chain drives and other moving parts of hoisting appliances should be provided with adequate safeguards. Hoisting appliances should be provided with such means, which will reduce the risk of any part of a suspended load becoming accidentally displaced or lowered.
- (p) It should be ensured that the cabin of the lifting machine in outdoor service:
 - (i) is made of fire resistant material,

- (ii) has a suitable seat, a footrest and protection from vibration,
- (iii) affords the operator an adequate view of the area of operation,
- (iv) affords the operator adequate protection against the weather, and
- (v) is provided with fire extinguisher.

4.8 Welding and Gas Cutting

- (a) Welding and gas cutting operations should be done by qualified and authorized persons only.
- (b) Safety work permit should be obtained (wherever necessary like presence of flammable or combustible material etc.) before flame cutting/welding is taken up.
- (c) Welding and gas cutting should not be carried out in places where flammable or combustible materials are kept and where there is danger of explosion due to presence of gaseous mixtures. In case the requirement cannot be avoided, specific approval and procedure should be ensured and adequate precautions should be taken.
- (d) Welding and gas cutting equipment including hoses and cables should be maintained in good condition.
- (e) Barriers should be erected to protect other persons from harmful rays from the work. When welding or gas cutting is done in elevated positions, precautions should be taken to prevent sparks or hot metal falling below on persons or combustible materials.
- (f) Suitable type of protective clothing consisting of fire resistant gauntlet gloves, leggings, boots and aprons should be provided to workers as protection from heat and hot metal splashes. Face shields with filter glasses of appropriate shade should be worn.
- (g) Adequate ventilation should be provided while welding, brazing and cutting the metals like zinc, brass, bronze, galvanised or lead coated material.
- (h) Welding and gas cutting on drums, barrels, tanks or other containers should be taken up only after ascertaining that they have been emptied, cleaned thoroughly and made free of flammable material.
- (i) Fire safety measures should be available as required near the location of welding/cutting operations.
- (j) Flash back arrestor should be provided with gas cutting and gas welding sets.

- (k) For electric (Arc) welding the following additional safety precautions should be taken:
 - (i) When electrical welding is undertaken the return lead of welding machine should be directly connected to the job invariably.
 - (ii) Provision must be in place in electric welding machine to prevent physical contact with live parts.
 - (iii) The welding cables and power cables should be routed separately to avoid entanglement.
 - (iv) The electric welding set should have suitable earth connections. There should be an electrical isolation device in the input power supply side on the welding machine.
- (l) Double gauges should be used for all gas cylinders used for cutting/welding. Pressure gauges/regulators should be in healthy condition.

4.9 Rotary Cutters/Grinders

- (a) All portable cutter/grinders should be provided with the wheel guard in position.
- (b) Grinding wheels of specified diameter only should be used on all grinders in order to limit the prescribed peripheral speed.
- (c) In pedestal grinder, the gap between tool rest and grinding wheel should be maintained less than 3 mm.
- (d) Goggle/face shield should be used during grinding operation.
- (e) No grinding wheel should be used after its expiry date.
- (f) Ear muff/ear plug should be used during the welding/cutting jobs.
- (g) Portable appliances, which are powered by single phase AC supply, shall be provided with three-core cable and three pin plug, otherwise the whole body should be double insulated.
- (h) Safety work permit should be obtained (wherever necessary like presence of flammable or combustible material etc.) before grinding is taken up.
- (i) Fire safety measures should be available as required near the location of grinding operations.

4.10 Concrete Mixing Equipment

- (a) Cement bags should be stacked on wooden planks in dry and leak proof area, 150 mm to 200 mm from the floor and 450 mm away

from walls. Height of the stack should not be more than 15 bags or 1.5 meters whichever is lower. Width of the stack should not be more than 4 bags or 3 meters. Lateral loading of the walls of the storage room by stacking should not be permitted. Stacking of the bags should not be used as a working platform.

- (b) Shuttering and supporting structures should be of adequate strength and approved by engineer-in-charge. This should be ensured before concrete is poured.
- (c) If the mixer has a charging skip the operator should ensure that the workmen are out of danger before the skip is lowered.
- (d) Adequate walking platforms (as per the AERB directives) are to be provided in the reinforcement area to ensure safe walking for pouring concrete on the roof.
- (e) When workmen are working/cleaning the inside of the drum of mixer, the power of the mixer should be switched off and "Do not operate" tag should be provided. The plant operation and cleaning of mixing pan should be carried out as per equipment supplier's instructions.
- (f) Interlocks between the cover and the mixer rotor shall be established to ensure that the agitator does not start when the cover is in open condition.
- (g) It should be ensured that moving parts of the elevators, hoists, screens, bunkers, chutes and grouting equipment used for concrete work and of other equipment used for storing and transporting of ingredients of concrete are securely fenced to avoid contact of workers with such moving parts.
- (h) It should be ensured that screw conveyors used for cement, lime and other dusty material are completely enclosed.
- (i) Workers engaged for handling bulk cement in a confined place should be provided with tight fitting goggles, approved respirators and protective clothing, which will fit snugly around the neck, wrist and ankles.
- (j) The following should be ensured for every pipe carrying pumped concrete:
 - (i) The scaffolding carrying a pipe for pumped concrete should be strong enough to support such pipe at a time when such pipe is filled with concrete or water or any other liquid and to bear safely all the building workers who may be on such scaffold at such time.

- (ii) Securely anchored at its end point and each curve on it.
 - (iii) Provided with an air release valve near the top of such pipe; and securely attached to a pump nozzle by a bolted collar or other adequate means.
- (k) The following should be ensured while using the electric vibrators in concreting work at a construction site of a building or other construction work such that:
 - (i) Such vibrators are earthed.
 - (ii) The leads of such vibrators are heavily insulated.
 - (iii) The current is switched off when such vibrators are not in use.
- (l) For obtaining a clearance for first pour of concrete and regular operation of ready mix concrete (RMC) plant, checklist given in Appendix-C shall be submitted to AERB along with the application for clearance.

4.11 Painting

- (a) Appropriate breathing air respirators should be provided for use by the workers when paint is applied in the form of spray, or a surface having lead paint is dry rubbed or scraped.
- (b) Only the quantity of paint, thinner and polish required for the day's work should be kept at the work spot. Excess storage should not be permitted at the work spot.
- (c) Smoking, open flames or sources of ignition should not be allowed in places where paints, varnish, thinner and other flammable substances are stored, mixed or used. A caution board, with the instructions written in national language and regional language, 'SMOKING - STRICTLY PROHIBITED' should be displayed in the vicinity where painting is in progress or where paints are stored. Symbols should also be used on caution boards.
- (d) All electrical equipment of paint storage room should be of explosion proof design. Suitable fire extinguishers/sand buckets should be kept available at places where flammable paints are stored, handled or used.
- (e) When painting work/hot resin mix is done in a closed room or in a confined space, adequate ventilation should be provided and ensured. In addition, suitable respirators should be provided. No portable electric light or any other electric appliance of voltage exceeding

24 volts should be permitted for use inside any confined space. Walkie-talkie or other means of communication should be provided. Rescue arrangement like full body harness with lifeline, tripod with pulley and extra BA sets should be available.

- (f) The workers should use PVC gloves and/or suitable barrier creams to prevent the skin contact with Epoxy resins and their formulations used for painting.

4.12 Demolition

- (a) Before any demolition work is commenced and also during the progress of the work, all roads and open area adjacent to the work site should either be closed or suitably cordoned. Appropriate warning signs should be displayed for cautioning approaching persons/vehicles.
- (b) Before demolition operations begin, it should be ensured that all the service lines are de-energized.
- (c) Persons handling demolition operations shall use appropriate PPE.
- (d) All demolition operations should be carried out with safe and duly approved procedures which shall include following but not limited to:
 - (i) No masonry/material should be permitted to fall in such masses or volume or weight so as to endanger the structural stability of any floor or structural support.
 - (ii) No wall, chimney or other structure or part of a structure is left unguarded in such a condition that it may fall, collapse or weaken due to wind pressure or vibration.
 - (iii) No floor, roof or other part of the building should be overloaded with debris or materials as to render it unsafe.
- (e) After the demolition, the debris and other materials collected should be disposed safely and not permitted to be dropped freely.
- (f) Entries to the demolition area shall be restricted to authorised persons wearing safety helmets and safety shoes.

4.13 Traffic

- (a) All the vehicles moving at sites should conform and comply with the requirements of Motor Vehicles Act, 1988 and the Rules made there under. All the drivers/operators of vehicles should possess valid driving license as per Motor Vehicles Act, 1988 or its latest amendment.

- (b) The facility should conduct operations so as to interfere as little as possible with the use of existing roads at or near locations where the work is being performed. When interference to traffic is inevitable such as road cutting or transit unloading of heavy equipment etc. notice of such interference should be given to the engineer-in-charge and safety officer well in advance with the details of start of the work and time required.
- (c) A cleaner/assistant must be available for all heavy vehicles whenever vehicles move forward as well as in the reverse direction. All vehicles should be fitted with proper reverse horns, back view mirrors and indicator signals.
- (d) Facility should ensure that the assessment of the driver's visual ability is carried out as per Rule 55 of the Atomic Energy (Factories) Rules, 1996/guidelines of advisory committee on occupational health (ACOH), AERB or as per the latest amendments in statutes.
- (e) Effective speed breakers with yellow stripes on the roads to regulate the speed at the vulnerable points should be installed. Effective barricading with adequate caution signs should be placed to warn the vehicle drivers whenever the jobs are carried out on the road.
- (f) All vehicles moving at the site should have roadworthiness certificate issued by the concerned authority.
- (g) Special limit boards and caution boards indicating turns should be installed wherever necessary.
- (h) In general, the following maximum speed limits should be specified and implemented. Vehicles speed limits should be as per Motor Vehicle Act or 20 Km/h. Extra precautions and care should be exercised particularly during heavy material/equipment movements.
- (i) Safety awareness programmes should be conducted for all the drivers of the light, medium and heavy vehicles.

4.14 Work in Radiation Area

The facility should follow the stipulated procedure under Atomic Energy Radiation Protection Rules, 2004 and AERB safety manual on 'Radiation Protection for Nuclear Facilities' (AERB/NF/SM/O-2) regarding work in the radiation area and other works related with radiography.

4.15 Work in and Around Water Bodies

- (a) When work is done at a place where there is risk of drowning, all necessary rescue equipment such as life buoys and life jackets should be provided and kept ready for use.

- (b) All necessary steps shall be taken for prompt rescue of any person in danger and adequate provision should be made for prompt first-aid treatment of all injuries likely to be sustained during the course of the work. Proper record of entry/exit to and from water bodies shall be maintained on shift basis and search operation shall be conducted as soon as any person is detected to be missing.
- (c) Caisson Work
 - (i) Safe means of access should be provided to the place of work in the caisson and adequate means should be provided to safely reach the top of caisson in the event of inrush of water
 - (ii) The work relating to construction, positioning, modification or dismantling of caisson shall be done under the supervision of a responsible person

4.16 Fire Safety

- (a) All provisions for fire safety shall be complied as per AERB safety standard on 'Fire Protection Systems for Nuclear Facilities' [AERB/NF/SS/FPS (Rev. 1)].
- (b) All necessary precautions should be taken to prevent outbreak of fires at the construction site. It should be ensured that all hot work is carried out under valid work permit.
- (c) Combustible materials such as wood, cotton waste, oil, coal, paints, chemicals etc., should be segregated and kept to the required bare minimum quantity at work place.
- (d) Containers of paints, thinners and allied materials should be stored in a separate room which should be well ventilated and free from excessive heat, sparks, flame or direct rays of the sun. The containers of paint should be kept covered or properly fitted with lid and should not be kept open except while using.
- (e) Adequate number of trained persons from approved fire training centre required to extend fire safety coverage should be ensured.
- (f) Fire extinguishers as approved by the engineer-in-charge/in-charge of fire station/safety-in-charge should be located at the construction site at appropriate places.
- (g) Adequate number of trained workmen in fire fighting who can operate fire extinguishers should be ensured.
- (h) Portable fire extinguishers with periodic inspection, maintenance and re-filling complying with the mandatory requirements should be ensured.

- (i) Availability of adequate water for fire fighting should be ensured.
- (j) Implementation of the provisions of various statutory licenses for storing gas cylinders, petroleum products, explosives etc. as per the relevant acts and rules should be ensured wherever required.

4.17 Environmental Safety

Relevant provisions of the state/central statutory authority regarding environment protection should be adhered to.

4.18 Public Protection

The Facility should make necessary provisions to protect the public. He should be bound to bear the expenses in defense of every action or other proceedings at law that may be brought by any person for injury sustained owing to neglect of any precaution required to be taken to protect the public. He should pay for the any such damage and cost which may be awarded in any such suit, action or proceedings to any such person, or the amount, which may be fixed as a compromise by any such person.

4.19 Safety of Visitors

- (a) Visitors for the project shall be given health and safety induction before they are allowed in to the construction project. It shall include the minimum PPE to be used, hazards and risks at the work area, restricted areas of entry, emergency response arrangements, etc.
- (b) Visitors shall always be accompanied by one of the employees of the project site.
- (c) Visitors shall not be allowed in the hazardous areas unless they are competent and trained to work in such areas.

4.20 Housekeeping

- (a) It should be recognised that a proper place for everything and everything in its place is maintained for a good housekeeping.
- (b) The material required for immediate use only should be brought to the designated workplace and stacked properly and labeled suitably.
- (c) All work spots, site office and surroundings should all times be kept clean and free from debris, scrap, concrete muck, surplus materials and unwanted tools and equipment. A day-to-day collection and disposal of scraps/debris should be done safely at designated place.
- (d) Electrical cables, leads and hoses should be so routed as to allow safe traffic by all concerned. Cable should be preferably supported on the brackets fixed along the wall to maintain safe access. Wherever

routing on the floor cannot be avoided, care should be taken to ensure mechanical protection of these cables and safe access is not disturbed.

- (e) No material on any work place should be so stacked or placed or disposed off as to cause danger, inconvenience or damage to any person or environment.
- (f) All unused scaffoldings, surplus/scrap materials and equipment/ systems like temporary electrical panels etc. should not be allowed to accumulate and shall be removed from the premises at the earliest.
- (g) Accumulation of water/oil spillages on the floor or any other workplace should be avoided.
- (h) Proper aisle space marking should be provided in all workplaces.

4.21 Other Statutory Provisions

Notwithstanding the clauses in the above subsections, there is nothing in these clauses to exempt the Facility from the provisions of any other act or rules in force in the Republic of India. In particular, all operations involving the transport, handling, storage and use of explosives should be as per the standing instructions and conform to the Indian Explosives Act, 1884 and the Explosives Rules, 1983. Handling, transport, storage and use of compressed gas cylinders and pressure vessels should conform to the Gas Cylinder Rules 2004 and Static and Mobile Pressure Vessels (Unfired) Rules 1981. In addition, The Indian Electricity Act 2003 and Indian Electricity Rules 2005, the Atomic Energy Act, 1962, the Radiation Protection Rules, 2004, the Atomic Energy (Factories) Rules, 1996 and AERB safety manual on 'Radiation Protection for Nuclear Facilities' (AERB/NF/SM/O-2) should be complied with.

5. PERSONAL PROTECTIVE EQUIPMENT

5.1 General

Although the primary approach in any safety effort is that the hazard to the workmen should be eliminated or controlled by engineering methods rather than protecting the workman through use of personal protective equipment (PPE). Engineering methods could include design change, substitution, ventilation, mechanical handling, atomisation etc. Under those situations when it is not possible to introduce any effective engineering methods for controlling hazards, it is necessary that workman use appropriate type of PPE. For example, in construction work there is the possibility of a hand tool, a bolt, or some loose material to fall from an elevated level and striking the head of workman working below. It is therefore necessary that construction worker wear a safety helmet. It is for such situations, both the Factories Act 1948 and the Atomic Energy (Factories) Rules, 1996 have provisions for use of appropriate type of PPE.

It is thus recognised that use of PPE is an important and necessary consideration in the development of a safety programme. Once the safety professional decides that PPE is to be used by workmen, it is essential to select right type of PPE and management should ensure that workman uses it and also PPE is correctly maintained.

5.2 Personal Protective Equipment (PPE)

- (a) All personal protective equipment as considered necessary should be made available for the use of the persons employed on the site and maintained in a condition suitable for immediate use. Also adequate steps should be taken by engineer-in-charge to ensure proper use of PPE.
- (b) All the PPEs in use should be as per relevant IS standards as referred in the AERB safety guidelines on 'Personal Protective Equipment' (AERB/SG/IS-3).
- (c) All persons employed at the construction site should use safety helmets. Safety helmet should be with BIS mark and should have its headband with back support and chin strap.
- (d) Workers employed on mixing asphaltic materials, cement and lime mortars should use protective goggles, protective foot wears, hand gloves and respirators as required.
- (e) Persons engaged in welding and gas-cutting works should use suitable welding face shields. The persons who assist the welders should use suitable goggles. Protective goggles should be worn while chipping and grinding.

- (f) Stonebreakers should use protective goggles. They should be seated at sufficiently safe distances from one another.
- (g) Safety goggles should be of shatterproof type and with zero power.
- (h) Persons engaged in or assisting in shot blasting operations and cleaning the blasting chamber should use suitable gauntlets, overalls, shatterproof and dust-proof goggles and self contained breathing apparatus set.
- (i) All persons working at heights more than 3.5 m above ground or floor and exposed to risk of falling down should use full body harness safety belts, unless otherwise protected by cages, guard railings, etc. In places where the use of safety belts is not feasible, suitable net of adequate strength fastened to substantial supports should be used.
- (j) When workers are employed in sewers and inside manholes that are in use, it should be ensured that the manholes are opened and are adequately ventilated at least for an hour. After it has been well ventilated, the atmosphere inside the space should be checked for the presence of any toxic gas or oxygen deficiency by a competent person and recorded in the register before the workers are allowed to get into the manholes. A pilot team should enter the area donning self contained breathing apparatus (SCBA). The manholes opened should be cordoned off with suitable railing and provided with warning signals or caution boards to prevent accidents. There should be proper illumination in the night. Depending upon the work situation, the facility should provide PPE including the SCBA as recommended by Head, industrial safety.

6. MEDICAL MANAGEMENT

6.1 General

- (a) The facility management/contractor shall make arrangements for the first aid and medical services for the injured or ill persons for prompt attention or aid.
- (b) The arrangement can be made by the contractor or an agreement can be in vogue with the facility .
- (c) The medical facilities at first-aid centre shall be adequate to immediately cater to the injured based on the hazard potential and probable severe injuries.
- (d) The first aid centre shall be provided with the adequate equipment and medicines for catering to the site requirements. The first aid centre shall be manned depending on the working hours/on round the clock shift basis. The services of at least one qualified medical practitioner (medical officer) shall be made available by the Facility management/contractor.

6.2 Medical Facilities

- (a) Medical facilities conforming to the provisions of the Atomic Energy (Factories) Rules, 1996 should be provided at all work sites.
- (b) The requisite medical facilities in the form of a well-equipped first aid centre manned by qualified nursing personnel should be provided at all work sites. Contractor may avail this facility as per terms and conditions of the contract.
- (c) In addition, well-maintained first aid boxes should be kept at each location of the work by the Facility/contractor and availability of the personnel trained in first aid should be ensured.
- (d) A manned and equipped ambulance should be available at work site during the working hours/on round-the-clock shift basis.
- (e) It should be ensured by the occupier that occupational health monitoring of contract workers is carried out as per provisions of the Factories Act 1948 as per the latest amendment and the stipulations/directions given by Atomic Energy Regulatory Board from time to time.
- (f) Display of emergency contact numbers of important persons and hospitals and route map of site shall be maintained at designated places.

6.3 Medical Management of Serious Injuries

- (a) In case of serious injuries, the injured should be shifted to the nearest first-aid centre at site immediately. The opinion of medical officer/certifying surgeon should be sought immediately for medical management.
- (b) After providing the first aid treatment the injured should be shifted to designated medical facility of the site/hospital for further medical assistance, in an ambulance along with a nursing attendant.
- (c) The doctor at the medical facility of the site/hospital attending the case shall assess the extent of injuries and render immediate medical aid. If the situation warrants trauma/special care the injured shall be shifted to the referral hospital, having all the requisite facilities for specialised treatment in ambulance along with a medical attendant.
- (d) A list of such referral hospitals for specialised medical management facilities for the injured persons should be available with the project management/Head, industrial safety and Head, medical services of the site for ready reference.

APPENDIX-A

APPLICATION FOR HEIGHT PASS

PART- A

Group/Section: _____

Agency: _____

1. Applicant's Name : _____
2. Facility address : _____
3. Residential address : _____
4. Age : _____
5. Sex : _____
6. Height : _____
7. Gate Pass No. : _____
8. Name of contractor/agency with whom engaged at present : _____
9. Height pass required for work at _____ m. Height
10. Description of present job : _____
11. Previous experience of working at height : _____

S.No.	Name of the Employer	Duration of Employment	Work Experience
1.			
2.			

12. Does the applicant suffer from any of the following ailments? (If yes details to be given):
 - (a) Blood pressure _____ (b) Epilepsy _____
 - (c) Flat foot _____
 - (d) Frequent headache or reeling sensation _____
 - (e) Mental depression _____ (f) Limping gait _____
 - (g) Aerophobia _____

Declaration:

I hereby declare that the above information furnished by me is true and correct. I shall always wear the safety belt and tie the life-line whenever working at unguarded heights of 3 m and above. I shall not misuse the height pass issued to me or transfer it to any other person. I shall never come to duty or work at height/depth under the influence of alcohol/drugs.

Date:

Name:

Sign:

(Applicants name and signature or loss time injury (L.T.I) incase he cannot sign. In case of LTI an authorised person shall explain each point/item to the individual and certify on that behalf below the LTI)

I certify that I am satisfied with the above certification of the individual for the application of height pass and request for issue of height pass to him.

Name :

Sign :
(Agency Concerned)

Countersigned by:

Section Head (Facility)

PART- B

MEDICAL FITNESS CERTIFICATE

Certified that I, Dr. _____ have examined Shri _____
_____ aged _____ on (date) _____ who has signed
below in my presence. General & physical examinations of Shri. _____
_____ do not reveal any abnormality. He does not suffer from any acute/
chronic skin disease or any contagious or infectious disease. His eye sight is normal
with/without glasses. In my opinion, Shri _____ is physically
and mentally fit for working at height.

Details of examinations are given below:

Personal attributes:

1. Height: _____
2. Chest: _____
3. Weight: _____
4. Hearing: _____
5. Sight: _____
6. Skin: _____
7. Heart beating: _____

Medical aspects:

1. Urine: _____
2. Blood pressure: _____
3. Epilepsy: _____
4. Flat foot: _____
5. Frequent headache
or reeling sensation: _____
6. Mental depression: _____
7. Limping gait: _____
8. Aerophobia: _____

Name:

Sign :

Rubber Stamp of
Medical Practitioner
with Reg. No.

Signature of workman:

PART-C

INDUSTRIAL SAFETY SECTION

(Considering the above medical certificate, the applicant has appeared on the following practical tests conducted by industrial safety section and the results are given below (strike off whichever is in-applicable))

- (a) Wearing a safety belt and tying the rope knot : Pass/fail
- (b) Walking over a horizontal structure at 3 m. : Pass/fail
height wearing a safety belt
- (c) General physique (OK/Not OK)

The above applicant's performance in the above tests has been satisfactory/unsatisfactory due to the following.

So I certify and issue this height pass to Shri _____
with Registration No. _____ in the height pass register. This is valid for one year
from the date of issue i.e. up to _____

Date:

Name:

Sign.:

Scientific Assistant (Safety)

Safety Officer

APPENDIX-B

FORM - 1

APPLICATION FOR TEMPORARY POWER SUPPLY AND USE OF ELECTRICITY AT WORK SITE DURING CONSTRUCTION [Prescribed under clause 4.6(d)]

1.	Name and address of user.	
2.	Reference of tender or work order (if applicable)	:
3.	Name & designation of tender/work order issuing authority.	:
4.	Power supply application number [†]	:
5.	Name and designation of tender/work order/work supervising authority (engineer-in-charge).	:
6.	Expected date of commencement of temporary supply	:
7.	Expected date of decommissioning of temporary supply	:
8.	Voltage level (LV/MV/HV)	
9.	Type of connection (1Ph/3Ph)	
10.	Connected load (Kw)	
11.	Maximum demand (KVA)/Power factor	
12.	Single line diagram* of proposed power distribution scheme along with equipment data sheet (downstream installation after point of connection).	Enclosed (Form-1A)/Not enclosed
13.	Name of overall supervisor and available qualified Staff	Enclosed (Form-1B)/Not enclosed
14.	Auxiliary equipment data sheet (meters, fire extinguisher, first aid box etc)	Enclosed (Form-1C)/Not enclosed
15.	Name and designation of provider's representative to whom the application is addressed.	:
16.	Name and designation of authorized signatory of user, who had submitted this application	:

[†] Power supply application number shall be different for same user with multiple applications for temporary supply

* All the drawings and tables shall be signed by user's representative indicated against 16 above.

Signature of authorised signatory of user

Signed endorsement of work order
supervising authority indicated
against 5 above.

FORM - 1A

EQUIPMENT DATA SHEET FOR OBTAINING TEMPORARY POWER SUPPLY AND USE OF ELECTRICITY AT WORK SITE DURING CONSTRUCTION

(Prescribed against item-12 of form-1)

Name and address of user:

Power supply application

Number:

Amendment No:-

References:- Single line diagram (SLD) of the power distribution scheme with all equipment details (Attach the SLD)

1. Identity	2. Type	3. Make & model	4. Manufacturer's S.No	5. Fixed/ Portable	6. Size	7. Last used date	8. Last test date	9. Latest test data	10. Rating

Signature of authorised signatory of user

Explanation of column headers:

1. Identity:- Identification mark/number/tag of equipment in single line drawing and layout drawing. Every equipment in single line drawing and layout drawing shall have suitable identification mark/number/tag.
2. Type:- Cable/CB/MCB/MCCB/ELCB/transformer/lightning arrestor/earthing station/earthing connection/motor/lighting fixture/switch/fuse/switch, socket box etc.
3. Make and model:- manufacturer's name and corresponding model no.
4. Manufacturer's S. No:- serial number and date in name plate if available. Else NA
5. Fixed/portable:- Equipment is installed/laid/anchored to surface or portable.
6. Size:- depending upon type of equipment and as desired by provider representative e.g. length for cables or all dimensions if heavy equipment like transformer.
7. Last used date. date of last use else NEW
8. Last test date. latest test date by user or by manufacturer if NEW
9. Latest test data:- IR, HV, resistance, functional test data depending upon the type of equipment as desired by provider's representative.
10. Rating:- name plate rating of equipment like voltage, current, power (apparent, active, reactive), IP of enclosure, size(cable cross section) etc. depending upon the type of equipment and as desired by provider's representative.

FORM - 1B

**STAFF DATA SHEET FOR OBTAINING TEMPORARY POWER SUPPLY
AND USE OF ELECTRICITY AT WORK SITE DURING CONSTRUCTION
(Prescribed against item-13 of form-1)**

Name and address of user:

Power supply application**Number:****Amendment No:-**

1. Name	2. Address	3. Tel.No.	4. Responsibility	5. Certification detail	6. Resuscitation training	7. Expe- rience	8. Other relevant training	9. Signature

Signature of authorised signatory of user

Explanation of column headers:

1. Name:- Name of agency/person
2. Address:-
3. Tel No:- regular, alternate and emergency telephone numbers
4. Responsibility:- whether responsible for installation, operation, maintenance, overall supervision etc. overall supervisor shall be indicated specifically.
5. Certification detail:- (a) type of certification e.g wire man license, electrical supervisor license, electrical contractor license, diploma in electrical engineering, degree in electrical engineering etc. (b) certifying agency e.g. state PWD, central PWD, CEA, name of college/university etc. (c) certificate/license number with date. (d) valid up to date or next renewal date must for contractor/supervisor license.
6. Artificial resuscitation training:- indicate YES/NO if the staff is trained to apply artificial resuscitation technique.
7. Experience:- number of years of experience.
8. Other relevant training :- any other training in electrical/safety course. Indicate name of training, duration (days/months), training providing agency.
9. Signature:- original signature of individual.

FORM - 1C

**AUXILIARY EQUIPMENT DATA SHEET FOR OBTAINING
TEMPORARY POWER SUPPLY AND USE OF ELECTRICITY
AT WORK SITE DURING CONSTRUCTION
(Prescribed against item-14 of form-1)**

Name and address of user:

Power supply application**Number:****Amendment No:-****Reference:- Layout drawing No. / _____**

1. Identity	2. Type	3. Make and model	4. Manufacturer's S. No	5. Fixed/ Portable	6. Size	7. Last used date

Signature of user's representative

Explanation of column headers:

1. Identity:- identification mark/number/tag of equipment in layout drawing.
2. Type:- earthing rod/megger/multi meter/earth resistance meter/fire extinguisher/s and bucket/first aid box/resuscitation chart/rubber mat etc.
3. Make and model:- manufacturer's name and corresponding model no.
4. Manufacturer's S. No:- serial number and date in name plate if available. Else NA
5. Fixed/portable:- equipment is installed/laid/anchored to surface or portable.
6. Size:- depending upon type of equipment and as desired by provider representative.
7. Last used date. NEW for new equipment. NA for passive devices like chart/mat etc.

FORM-1D

[Prescribed under clause 4.6(e)]

Name of user agency

Power supply application number:-

CERTIFICATE BY THE LICENSED ELECTRICAL CONTRACTOR

Certified that subject installations have been carried out by us or checked by us and is in accordance with I.E. Rules. The documents submitted with subject temporary power supply application (Form-1) is verified by us and the complete installation confirms to these documents.

We shall periodically inspect/check the installation so that no unsafe situation arises during use of this temporary power supply system. We understand that for the entire duration of existence of this temporary power supply system we shall be responsible for any unsafe installation, operation, maintenance, testing of the same which results into any loss of life or material. We shall immediately report to the provider's representative and ensure de-energisation of supply if any unsafe situation arises during use of this temporary power supply system.

Signature of the authorised signatory of licensed electrical contractor

Rubber seal of licensed electrical contractor

Date

CERTIFICATE BY THE USER

Certified that my/our installations have been carried out in accordance with the I.E. Rules and that I/We have employed competent agency/staff to handle the installations which is strictly as per the staff data sheet submitted in Form-1B.

We understand that for the entire duration of existence of this temporary power supply system we shall be responsible for any unsafe installation, operation, maintenance, testing of the same which results into any loss of life or material. We shall immediately report to the provider's representative and ensure de-energisation of supply if any unsafe situation arises during use of this temporary power supply system.

Signature of the authorised signatory of user

Name of signatory

Date

FORM -1E

[Prescribed under clause 4.6(f)]

CERTIFICATE BY THE SAFETY OFFICER

Certified that I have inspected the electrical installation referred here in after satisfying myself about the safe condition of the installation, I hereby recommend that the service connection be given to the contractor.

Signature of the safety officer

Name:

Date:

AUTHORISATION BY THE ELECTRICAL ENGINEER

The subject power supply application along with completed installation, necessary certificates (as per Form-1 of Appendix-B) is scrutinised by us. The proposal found to be in order and the installation can be energised on _____ in presence of your designated overall supervisor as indicated in Form-1B. Enclosed herewith the test report data sheet Form-1F. You are requested to carry out the periodic testing of equipment and submit the test report periodically as per this form.

Signature of the electrical engineer
of provider

Name of signatory

Date

FORM - 1F

**TEST/MAINTENANCE REPORT DATA SHEET OF EQUIPMENTS OF
TEMPORARY POWER SUPPLY SYSTEM AT WORK SITE DURING
CONSTRUCTION
(Prescribed against form-1E)**

Name and address of user:

Power supply application**Number:****Amendment No:-**

1. Identity	2. Type	3. Last tested date	4. Next due date of any test	5 Frequency of IR test	6 Frequency of HV test	7. Frequency of earth resistance test	8. Other tests

Signature of electrical engineer of provider

Explanation of column headers:

1. Identity:- identification mark/number/tag of equipment in single line drawing and layout drawing. Every equipment in single line drawing and layout drawing shall have suitable identification mark/number/tag.
2. Type:- Cable/ CB/ MCB/ MCCB/ ELCB/transformer/lightning arrestor/earthing station/earthing connection/motor/lighting fixture/switch/fuse/switch, socket box etc.
3. Last test date: - latest test date indicated in Form-1A.
4. Next due date of any test:- as worked out by frequency of tests indicated in subsequent columns.
5. Frequency of IR test:- required frequency depending upon type of equipment and location of installation. NA if not required after installation.
6. Frequency of HV test:- required frequency depending upon type of equipment and location of installation. NA if not required after installation.
7. Frequency of earth resistance test:- required frequency depending upon type of equipment and location of installation. NA if not required after installation.
8. Other tests: - name and description of any other essential tests/maintenance activity and required frequency depending upon type of equipment and location of installation. NA if not required after installation.

APPENDIX-C

CHECKLIST FOR OPERATION OF READY MIX CONCRETE (RMC) PLANT

(To be submitted to AERB along with application for construction consent
and a copy to be retained by site)

(Verifiable documents like supplementary checklists, work sheets, spread
sheets etc. should be maintained for each item of the checklist
wherever relevant)

Serial No.	Points to be Checked	Remarks
1. 0	Prior to Installation of the RMC Plant	
1.1	Whether acceptance report on healthiness of the pre-identified critical plant equipment like concrete mixer, pumps, programmable logic controllers, conveyors, etc. prior to installation available ?	
1.2	Whether approval for the location of the plant site after evaluation and review by project management available ?	
1.3	Whether review of the vendor documents like operation and maintenance manual, vendor specifications, safety manual, etc. of contractor carried out by project management ?	
1.4	Whether job hazard analysis reports, erection procedures, checklists for critical activities available ? Are the operators aware of it ?	
1.5	Whether adequate number of line managers/supervisors/operators for carrying out the jobs safely are identified and availability is ensured ?	
1.6	Whether safety surveillance requirements of construction activities both by contractor and facilities clearly spelt out?	
1.7	Whether adequate work control measures like construction permit, safety work permit system, height pass system, etc. for safe job performance are available ?	
1.8	Whether any facilities officer is assigned the responsibility of the RMC Plant ?	
2.0	Commissioning/Operation of RMC Plant	
2.1	Whether reports on healthiness of material handling equipment like hoists, belt conveyors, buckets, hoses, including electrical equipment etc. are available ?	

APPENDIX-C (CONTD.)

CHECKLIST FOR OPERATION OF READY MIX CONCRETE (RMC) PLANT

Serial No.	Points to be Checked	Remarks
2.2	Whether machine guards for pulleys, power shafts, rollers, etc. are available ?	
2.3	Whether availability of safe operating procedures, emergency procedures, process diagrams, power supply diagrams, details of interlocks, operation & maintenance manual (provided by supplier/vendor) ensured ?	
2.4	Whether adequate number of qualified, trained and experienced operators for safe operation of the plant including mechanism/method of operational control and command available ?	
2.5	Whether periodic surveillance programme for equipment, logics, interlocks, process parameters, trips, noise and illumination levels, etc. and measures to take corrective actions are available ?	
2.6	Whether periodic checks are carried out to ensure display of all interlocks and warning signals in PLC monitor ?	
2.7	Whether operations control measures like log sheets, work permits, procedures, instruction sheets, by-passing/jumpering trips, etc. are available ?	
2.8	Whether access to medical first-aid box & fire extinguishers, etc. available ?	
3.0	Operating/Working Areas	
3.1	Control Room	
3.1.1	Whether adequate information on process equipment and parameters, logics and control available ?	
3.1.2	Whether clear view of the plant from the control room to check entry of personnel into operating areas is available ?	
3.1.3	Whether availability of distinct window panels to distinguish process parameters, alarms and trips are verified ?	
3.1.4	Whether audio alarm is available in the field to give warning prior to starting of concrete mixer & conveyor belt ?	
3.1.5	Whether relevant operating and maintenance documents available and accessible ?	

APPENDIX-C (CONTD.)

CHECKLIST FOR OPERATION OF READY MIX CONCRETE (RMC) PLANT

Serial No.	Points to be Checked	Remarks
3.1.6	Whether operational controls preventing re-setting of operational parameters, trips by-passing, logic changes, etc. are available in control room ?	
3.1.7	Whether operational data and information logged chronologically indicating the status of equipment running & shutdown, maintenance works planned and taken up.	
3.1.8	Whether means of communication between operator and control room are available ?	
3.2	Aggregates Storage/Handling Areas	
3.2.1	Whether aggregates/materials stored separately in suitable weatherproof enclosures ?	
3.2.2	Whether routes for movement of vehicles clearly defined ?	
3.2.3	Whether reverse horns, rear view mirror, etc. on all dumpers/trailers/trucks are provided ?	
3.2.4	Whether machine guards for rotating/moving/conveying machines available in place ?	
3.2.5	Whether engineered noise control measures available in the crushing areas ?	
3.2.6	Whether usage of ear muffs for ear protection in noisy areas enforced ?	
3.2.7	Whether trip/emergency stop switch/pull cord mechanisms, etc. to the moving/rotating equipment like belt conveyors, crushers etc. are available and healthy ?	
3.2.8	Whether adequate dust control measures in working areas available ?	
3.2.9	Whether adequate illumination is provided in the working areas ?	
3.2.10	Whether safety/warning sign boards available to prevent persons approaching operating crushers/belt conveyors etc ?	
3.3	Storage Hoppers/Silos	
3.3.1	Whether suitable access with handrails to reach to the top of hoppers/silos provided ?	

APPENDIX-C (CONTD.)

CHECKLIST FOR OPERATION OF READY MIX CONCRETE (RMC) PLANT

Serial No.	Points to be Checked	Remarks
3.3.2	Whether proper walk ways with guard railing to access to different storage areas available ?	
3.3.3	Whether measures to prevent clogging of equipment like air fluidiser, etc. are available ?	
3.3.4	Whether controls and safety measures for feeders like belt conveyors to the silos/hoppers, etc. is available ?	
3.3.5	Whether dust suppression and noise control measures are in place ?	
3.3.6	Whether safety measures to enter into silos/hoppers for operation/maintenance requirements.	
3.3.7	Whether safe access for sampling locations/areas and procedure for collecting the samples are available ?	
3.4	Concrete Mixer Areas	
3.4.1	Whether safe access and working platform in mixing area provided ?	
3.4.2	Whether safe condition of the mixers, pumps, etc. used in the areas is ensured ?	
3.4.3	Whether proper identification tags for equipment, pipelines etc. are available ?	
3.4.4	Whether safe condition of the electrical equipment like local push buttons, panels, cables etc. ensured ?	
3.4.5	Whether adequate illumination in the working areas is ensured ?	
3.4.6	Whether interlocks of Mixers are in healthy state ?	
3.4.7	Whether sand bin is provided with electro-mechanical vibrator for easy material flow ?	
3.4.8	Whether warning signals to prevent persons approaching operating mixers in place ?	
3.4.9	Whether proper storage of admixtures to prevent freezing and availability of material safety data sheets for admixtures and other chemicals are ensured ?	
3.4.10	Whether collection trays have been provided under overhead conveyor belt to prevent fall of material ?	

APPENDIX-C (CONTD.)

CHECKLIST FOR OPERATION OF READY MIX CONCRETE (RMC) PLANT

Serial No.	Points to be Checked	Remarks
3.4.11	Whether the mixing cylinder/drum has emergency manual discharge facility ?	
4.0	Electrical Safety	
4.1	Whether proper isolating switches/isolators are provided for all equipment in the field as well as in control room ?	
4.2	Whether proper grounding/earthing arrangement for all electrical installations metallic structures and panel boards provided and recording of earth pit resistance values planned ?	
4.3	Whether fuses of adequate rating are available to limit overloading of circuits ?	
4.4	Whether earth leakage circuit breakers in all circuits are provided and tested periodically to ensure their healthiness ?	
5.0	Particulate Emissions	
5.1	Whether provisions of measurement of particulate emissions are available ?	
5.2	Whether actions to be taken in case of more visual emissions are available ?	
5.3	Whether methods to prevent/control spread of dust in working areas available ?	
6.0	General Requirements	
6.1	Whether emergency services like fire station, first aid, hospital etc accessible ?	
6.2	Whether specific line staff/supervisors for carrying out routine, special and emergency works with certain instructions and communications identified and trained ?	
6.3	Whether do's and don'ts while handling refrigerants like ammonia and admixtures used in concrete mixing displayed promptly ?	
6.4	Whether the use of personal protective equipment like helmet, safety belt, self contained breathing apparatus/canister, hand gloves, apron, face shield, safety shoes, gumboots etc. has been ensured ?	

APPENDIX-C (CONTD.)

CHECKLIST FOR OPERATION OF READY MIX CONCRETE (RMC) PLANT

Serial No.	Points to be Checked	Remarks
6.5	Whether emergency procedures to be followed during ammonia leaks, fires, etc. are available ?	
6.6	Whether fire extinguishers are available at various critical locations ?	

PART-B
CONTROL OF WORKS
(CONTRACTORS)

7. INTRODUCTION

7.1 General

The Department of Atomic Energy(DAE) through its constituent units execute various site works either by their own manpower or by manpower of various outside agencies. The nature of contracts with outside agencies can be works contracts, engineering procurement contracts, purchase contracts, minor fabrication contracts etc. These site works involve entire gamut of conventional industrial activities like excavation, rock blasting, earth handling, construction, material handling, fabrication, installation, operation, maintenance etc. of nuclear or conventional plants/facilities. This is a challenging responsibility for the contractor due to the complexity of problems like quality of workforce (which may be unskilled, illiterate, migratory) available for labor-intensive jobs, lack of coordination among agencies at site, lack of safety awareness among concerned authorities, time schedules of project etc. As a principal employer, facility management shall be responsible to ensure health and safety of all personnel engaged for the work. In this process, the contractor through his established measures shall ensure that the guidelines are implemented. However the facility management shall monitor the compliance with the provisions outlined in the guidelines through periodic supervision and review. Any accidental injury or loss of life is detrimental to the facility as well as the society. This ‘guidelines’ covers the safety organisation and the safety management system requirements in sections two and three. The work specific safety precautions are covered in section four. The requirements relating to personal protective equipment and medical management are covered in sections 5 and 6.

7.2 Objective

This ‘guidelines’ has a basic framework of industrial safety organisation, safety management systems, safe work procedures to maintain a safe working environment for all personnel and to prevent any unsafe condition/act endangering the life of personnel engaged for industrial activities. The major objectives of this ‘guidelines’ are:

- (i) To create awareness among workers about industrial hazards and safe working procedures.
- (ii) To lay down safe work procedures and systems to be followed for different type of industrial activities.
- (iii) To establish a robust safety management system.
- (iv) To protect the health and ensure the safety of the workers from industrial activities.

7.3 Scope

This 'guidelines' is essential for implementation and assurance of conventional safety in areas such as industrial, chemical, electrical, fire, environmental and is applicable for all works executed through contracts, like engineering procurement contract, minor fabrication contract etc. Where the execution of work is envisaged in radiation controlled area or involves handling and fabrication of any nuclear material, additional precautions noted in relevant AERB safety documents on radiation protection shall also be applicable.

8. SAFETY ORGANISATION

8.1 General

- (a) Construction projects have significant health and safety hazards, which need to be managed systematically since the project inception stage to achieve incident-free completion of jobs. Contractor should have well-defined safety organisation which helps in effective implementation of safety management systems and ensures health and safety of workers.
- (b) The top management of contractor should assure that all the provisions of relevant Acts & Rules are conformed to.
- (c) Safety organisation should carry out safety surveillance, safety training, safety enforcement measures, safety audit etc. related to all works to fulfill the overall safety requirements of this 'guidelines'.
- (d) Safety functionaries should be exclusively assigned with the work related to protection of health and safety of workers.
- (e) IS: 18001: 2007 gives detailed requirements of health and safety management system requirements. IS: 15793 gives requirements of good practices for managing environment, occupational health and safety legal compliance. This 'guidelines' prescribes requirements in addition to IS: 18001:2007 and IS: 15793 and gives guidelines on implementing these specific to a construction project.
- (f) The requirements prescribed in various central and state regulations including *Building and other Construction Workers (Regulation of Employment and Conditions of Service) Act, 1996* and rules framed thereunder with respect to managing health and safety in construction projects, shall be complied with.

8.2 Organisational Structure for Safety Management

- (a) The Contractor shall deploy qualified and experienced line management personnel for supervising the jobs to be carried out safely by workers. In order to oversee the industrial and fire safety aspects during execution of hazardous jobs (listed out in para 9.11) by the contractors, at least one safety supervisor with the qualifications and experience mentioned in Table -2 shall be in place irrespective of the man power deployed by the contractor.
- (b) The qualification, experience and the minimum number of safety professionals to be deployed by contractor shall be as per the following table:

**TABLE-2 : QUALIFICATION, EXPERIENCE AND NUMBER OF
SAFETY PROFESSIONALS FOR CONSTRUCTION
PROJECTS**

Category of safety person	Mandatory requirement	Qualification
Safety officer	<p>One in each shift (minimum) up to 1000 workers.</p> <p>If number of workers in a shift (including contractor's workers) exceeds 1000, additionally one safety officer should be deployed for every 1000 workers or part thereof.</p>	<p>Degree in engineering/ technology and diploma in industrial safety with minimum two years of experience</p> <p>or</p> <p>Diploma in engineering with diploma in industrial safety with minimum 6 years experience</p> <p>or</p> <p>A recognised degree in physics or chemistry and has practical experience of working in a factory in a supervisory capacity for a period of not less than 5 years.</p> <p>Notwithstanding the provision contained in the above criteria any person who</p> <p>(i) possesses a recognised degree or diploma in engineering or technology and has had experience of not less than five years in a department of the central or state government which deals with the administration of the Factories Act, 1948 or the Dock Workers (safety, health and welfare) Act, 1986 (54 of 1986)</p> <p>or</p> <p>(ii) Possesses a recognised degree or diploma in engineering or technology and has had experience of not less than 5 years, fulltime on training, education, consultancy, or research in the field of accident prevention in industry or in any institution, shall also be eligible for appointment as a safety officer:</p>

**TABLE-2 : QUALIFICATION, EXPERIENCE AND NUMBER OF
SAFETY PROFESSIONALS FOR CONSTRUCTION
PROJECTS (CONTD.)**

Category of safety person	Mandatory requirement	Qualification
		Provided that competent authority may, subject to such condition as it may specify, grant exemption from the requirement of this sub rule if in its opinion, a suitable person possessing the necessary qualification and experience is not available for appointment.
Safety supervisor	<p>One in each shift (minimum) up to 500 workers</p> <p>or</p> <p>One Supervisor for any hazardous job (listed in para 9.11) if, carried out by Contractor irrespective of number of workers.</p> <p>If number of persons working in a shift (including the contractors' workers) exceeds 500, additionally one safety supervisor should be deployed for every 500 workers or part thereof.</p>	Diploma in engineering and diploma in industrial safety

9. SAFETY MANAGEMENT

9.1 General

The construction agencies (contractors) shall be asked to submit a project specific health and safety plan (construction safety management plan) proposing the methodology for managing health and safety and their capability in completing the project in a safe manner.

9.2 Safety Policy

- (a) The facility and the construction agency jointly or separately shall have a written statement prescribing the health and safety policy of the organisation. The health and safety policy conveys the management commitment and intent of the organisation towards health and safety, its organisation and arrangements to ensure that the set objectives are met. It also provides a framework for establishing, maintaining and periodically reviewing health and safety objectives and targets.
- (b) Health and safety policy shall meet the requirements of *Building and other Construction Workers (Regulation of Employment and Conditions of Service) Act, 1996* and IS 18001.
- (c) The policy shall be communicated to all stakeholders through display and other means. The policy shall be displayed in local language(s) which may be understood by majority of the workmen.

9.3 Safety Plan

- (a) A project specific health and safety plan shall be developed by the contractor and approved by the facility. On approval by the facility, health and safety plan shall be reference document for implementation, control and monitoring of health and safety aspects of the project by the Contractor.
- (b) Project health and safety plan shall describe how the project specific health and safety objectives and targets shall be achieved. It shall define the road map for achieving the standards that an organisation lays down for itself so that efforts can be coordinated, synergized and monitored.
- (c) Health and safety plan shall explain the means of establishing a positive health and safety culture at the project site. Health and safety plan shall identify and enumerate the control measures to mitigate the risks to the project completion arising out of health and safety issues so that the project is allowed to proceed without interruption and executed as per schedule.

Salient aspects that may be covered in the project health and safety plan are:

- (i) Project specific health and safety objectives, targets and programmes in line with health and safety policy.
- (ii) Hazard identification and risk assessment
- (iii) Meeting legal and other requirements
- (iv) Health and safety organisation
- (v) Resources, roles, responsibility and authority
- (vi) General health and safety rules
- (vii) Health and safety requirements to be followed by sub-contractors
- (viii) Operation control procedure
- (ix) Activities requiring work permit system and its procedure
- (x) Management of traffic safety inside the project
- (xi) Access control of employees
- (xii) Safety of visitors
- (xiii) Management of critical activities such as work at height, material handling, working with plant and machinery, etc.
- (xiv) Safe handling of chemicals, explosives, gas cylinders, electrical equipment etc.
- (xv) Ensuring the competency and awareness of the workmen
- (xvi) Fire prevention and fire fighting plan
- (xvii) Emergency preparedness and response plan
- (xviii) Traffic management plan
- (xix) Training matrix
- (xx) Personal protective equipment matrix
- (xxi) Health and safety performance monitoring measures such as inspection and audit
- (xxii) Incident reporting and investigation procedure
- (xxiii) Proactive and reactive indicators of health and safety
- (xxiv) Reward and reprimand for health and safety performance
- (xxv) Checklist and formats.
- (xxvi) Health monitoring plan for employees/workers exposed to hazardous jobs.

- (d) The risk control measures identified shall meet the provisions of *Building and other Construction Workers (Regulation of Employment and Conditions of Service) Act, 1996*, other legislations and provisions of various safety related standards.
- (e) Procedures shall be established for timely recording and reporting of information required for continual improvement of health and safety performance.

Internal reporting procedures shall cover:

- (i) Incident reporting
- (ii) Non-conformance reporting
- (iii) Health and safety performance reporting
- (iv) Hazard identification reporting

External reporting shall cover

- (i) Statutory reporting requirements

The recording of reporting of health and safety performance shall be clearly documented in the health and safety plan.

9.4 Roles, Responsibility and Authority

- (a) Contractor shall define, document and communicate the roles, responsibilities and authorities of all personnel who manage, perform and verify activities having an effect on health and safety risks. It shall also include subcontractors and visitors.
- (b) The line management personnel who are responsible for execution of activities are directly responsible for health and safety in the work under their control.
- (c) Health and safety group and health and safety officers are responsible for guiding the top management of their own organisation on health and safety issues and facilitating the implementation of health and safety in the project site. For duties and responsibilities of health and safety officers refer Atomic Energy (Factories) Rules-1996.
- (d) Health and safety supervisors shall be engaged to assist the health and safety officers in performing their duties.
- (e) Management shall provide adequate resources essential to effectively manage the health and safety management system requirements of the project.

9.5 Design and Engineering

- (a) Design drawings, construction methodology and plans shall be reviewed to determine whether any additional risks may arise during the construction due to the features in the design or methodology.

Attention shall be paid to:

- (i) Providing permanent hooks and loops for tying safety slings of workers
 - (ii) Providing holes or such arrangements to the structure to which safe working platforms and safety nets can be connected
 - (iii) Laying permanent slings, grab rails/bars to be used by the workers
 - (iv) Permanent provision for attaching railings
 - (v) Provision for alternative access to the trapped or distressed workers
 - (vi) Provision for communication
 - (vii) Design facilitating barricading of the area around work site without causing hindrance to building functional activities
 - (viii) Durability of such safety related permanent design integrated elements
 - (ix) Other safety practices required for the type of works involved
 - (x) Significant risks from construction materials, which cannot be avoided in the design.
- (b) Analysis of design and integration of safety measures, as described above, should be undertaken as value engineering through multi-stakeholder consultation, necessarily involving designers, owner/client, operation/maintenance management and construction agency.
- (c) While need for special work methodology and enabling infrastructure is considered to make conditions safe for construction, attention shall also be drawn to the safety during maintenance operations (including inspections which may be necessary before project commissioning as well as maintenance).
- (d) It shall also be ascertained whether it would be feasible (within the time and cost considerations) to erect necessary temporary enabling infrastructure. If, in the due assessment by the project manager, it is established that the design, as proposed, would continue to be unsafe during construction and maintenance operations unless special enabling infrastructure is created and work procedures specifically drawn, the design shall be reviewed.

9.6 Construction Planning

- (a) Prior to the start of construction work, detailed planning shall be carried out which may include:
 - (i) Identifying aspects of design that have bearing on health and safety during construction stage.
 - (ii) While scheduling the various activities of the construction, allowing adequate time to carry work in accordance with health and safety requirements.
 - (iii) Reviewing the proposed work method of various activities, identifying health and safety hazards of activities in the project and assessment of the risk level.
 - (iv) When the risk level is unacceptable, taking additional control measures including revision of the work methodology so that identified risk is at ALARP (As Low as Reasonably Practicable) level.
 - (v) Planning and establishing the facilities for implementation of health and safety such as workmen training facility, health centre for medical check-up and first aid, access control of employees, etc.
 - (vi) Ensuring that the temporary establishments at project site such as site offices, workmen camps, toilets, canteens and rest sheds, etc. are created meeting the requirements of the relevant statutes and standards.
- (b) Facility shall ensure that the construction agency has understood the challenges and has planned to meet the project specific health and safety requirement through appropriate competencies.
- (c) Health and safety measures need proper coordination by the construction agency and such efforts of the construction agency shall be reviewed, monitored and appropriately guided by the facility.
- (d) In respect of sub-contractors, project manager of the construction agency shall ensure that the sub-contractors meet the health and safety requirements of the project. Health and safety control and monitoring shall be established specific to the needs of the project.

9.7 Safety Communication

- (a) Procedures shall be established to communicate significant hazards and risks to and from employees and other interested parties. The health and safety hazards and risks may be communicated in the following ways:

- (i) Sharing of accidents case studies which occurred in the project site as well in other similar projects
- (ii) Safety induction and orientation training
- (iii) Health and safety posters and displays
- (iv) Health and safety campaigns and competition involving the employees
- (v) Sharing of results of the audits, inspections and other monitoring systems
- (vi) Establishing a system for collecting feedback on health and safety from employees and other interested parties
- (vii) Tool box meeting
- (vii) Safety signage.
- (b) Health and safety communications addressed to workmen shall preferably be in local language(s) understandable by majority of the workmen.
- (c) The facility and construction agency shall jointly endeavour to promote a positive health and safety culture at the project. Top management of the organisations should exhibit a visible management commitment and felt leadership towards health and safety. This shall be achieved by participating in health and safety programmes such as:
 - (i) Project health and safety committee meeting
 - (ii) Health and safety walk down
 - (iii) Including health and safety in all performance review meetings
 - (iv) Exhibiting a safe behaviour while at site.
- (d) The top management should clearly communicate that it considers safety as core value and it shall not allow it to get compromised. Such messages when it reaches down the level in the organisation enable to create a positive health and safety culture.

9.8 Safety Monitoring Programme

- (a) The objective of the safety surveillance programme should address assurance of effective implementation of safety measures in execution of works. Following surveillance programme should be in place at sites. The safety organisation should monitor, maintain record and follow up for corrective actions.

- (b) The surveillance programme should consist of identification of safety related deficiencies and status of corrections thereof, the implementation of protective measures, the safe work practices, human behavior etc.
- (c) Specific surveillance should be ensured with respect to testing of equipment, portable power tools, electrical equipment and tools, hand tools, surveillance of material handling equipment, transport equipment, earth moving equipment, gas cylinders, stores, etc. to comply with various statutory requirements.
- (d) Surveillance on safety awareness and training compliance including induction training, on the job training and refresher training, job specific pre-job briefing, job hazard analysis, etc. as per facility's guidelines should be ensured.
- (e) Safety related deficiencies (SRDs) shall be detected by any employees/worker of construction agency and communicated to the line manager for corrective actions. The corrective action shall be monitored and records shall be maintained.
- (f) Systematic updating of SRDs attended and pending should be made available by the contractor for verification of facility.
- (g) The health and safety performance monitoring and measurement procedures shall provide for:
 - (i) Both qualitative and quantitative measures appropriate to the project
 - (ii) Monitoring the extent to which project health and safety objectives are met
 - (iii) Proactive measures of compliance that measures compliance with health and safety plan, operational control procedures and legislation
 - (iv) Reactive measures of performance to monitor accidents, ill health, near misses and non-conformances
 - (v) Monitoring dangerous occurrences
 - (vi) Fire occurrences
 - (vii) First aid injuries.
- (h) Health and safety inspections shall be preferably conducted by a team of the concerned engineer, health and safety officer and area in-charge of the contractor.

- (i) The type of inspections that shall be carried out and the frequency shall be decided during the planning stage and documented in the project health and safety plan. The health and safety inspections should include:
 - (i) General site health and safety inspection
 - (ii) Electrical safety inspection
 - (iii) Plant and machinery inspection
 - (iv) Health and hygiene inspection
 - (v) Scaffolding safety inspection.
 - (vi) Portable tools and tackles
 - (vii) Lifting tools and tackles
 - (viii) Fire equipment inspections
 - (ix) Illumination level and noise level monitoring
- (j) Status of health and safety implementation shall be measured and monitored by several proactive indicators which include the following:
 - (i) Compliance level of project health and safety plan
 - (ii) Compliance level of health and safety observations with in the target date
 - (iii) Implementation status of training plan
 - (iv) Implementation status of corrective and preventive actions
 - (v) Compliance level of pre-employment medical checks and periodic medical checkups
 - (vi) Compliance level of legal and other requirements
 - (vii) Percentage of activities for which detailed project specific risk assessment is conducted.
- (k) Procedures shall be established to report, investigate and analyze incidents. The procedures shall involve:
 - (i) Members of the incident investigation team
 - (ii) Agencies to be reported in case of incidents
 - (iii) Time period within which incidents need to be reported
 - (iv) Methodology for investigation and determining the root cause of accidents.

These procedures shall form a part of the project health and safety plan and monitored on a regular basis for its effectiveness.

- (l) All incidents including near miss cases, accidents and dangerous occurrences shall be thoroughly investigated, direct and root causes determined and corrective action planned. Incidents may be analysed covering the following ways to prepare and implement an effective prevention plan:
 - (i) Body part injured
 - (ii) Age of the victims
 - (iii) Time of accidents
 - (iv) Causes of accidents
 - (v) Nature of injury.

For detailed guidelines on analysis of incidents and computation of injury rate refer IS 3786.

- (m) The following reactive health and safety indicators should be used to measure and monitor the health and safety performance of the project site:
 - (i) Number of near miss cases
 - (ii) Number of first aid cases
 - (iii) Lost time injury frequency rate
 - (iv) Lost time injury severity rate.
- (n) The health and safety performance of subcontractors shall be monitored on a regular basis and necessary directive and support shall be given to achieve the set health and safety objectives and targets.
- (o) All accidents leading to property damage/personnel injuries/fatal accident/near miss and dangerous occurrence should be reported to the facility's engineer-in-charge immediately
- (p) All 'near-miss' accidents should also be recorded/reported and investigated and recommendations arising out should be implemented on priority.

9.9 Training/Orientation

- (a) It shall be ensured that all employees are competent to perform the assigned work safely on the basis of appropriate education, training or experience. The competency requirements of different categories of employees shall be mapped and procedures shall be implemented to ensure that those deployed meet the competence requirements.

- (b) The objective of health and safety training shall be to equip the employee with necessary knowledge and skill to perform the work assigned to him in a safe manner, to foster continual improvement and to imbibe safety culture.
- (c) Preferably, the training should be carried out away from the working place of the participants to ensure focused attention on the training for both trainer as well as trainees.
- (d) After completion of training due procedure shall be followed for obtaining the feedback from the participants on the effectiveness of the training. Effectiveness of training imparted shall be monitored for continual improvement and necessary corrections in implementation.
- (e) The training/orientation programme should be implemented to meet the mandatory requirements. [Rule 43(2) (m) of the Atomic Energy (Factories) Rules 1996]. The training should be phased as follows:
- (f) Induction cum orientation training should include the overall safety aspects of the work and give a general overview of the various hazards, the particular activities and the do's and don'ts. As a part of training, workers should also be given demonstrations on use of personal protective equipment, first aid and fire-fighting equipment, fire mock drills, other emergency preparedness etc.
- (g) The line manager along with the safety representative should conduct pre-job briefing on day-to-day basis prior to specific hazardous jobs. This will make the workers aware of the hazards and the precautions to be taken.
- (h) Refresher training should be imparted to each worker at least once in a year.
- (i) A training schedule should be prepared by the construction agency and communicated to facility for concurrence.
- (j) Records of training, demonstration and pep talk should be maintained.

9.10 Permit to Work System

- (a) Activities requiring permit to work shall be decided before starting the construction and shall be suitably documented in the project health and safety plan. Some of the activities which shall require permit to work are:
 - (i) Excavation
 - (ii) Entry into confined spaces
 - (iii) Electrical work (HV/LV)

- (iv) Opening manholes, covers and grills
- (v) Blasting operation
- (vi) Hot work
- (vii) Work on plant and machinery and other power driven equipment
- (viii) Working at height
- (ix) Working at night
- (b) The contractor should establish a permit to work system for any other hazardous activity, which it feels necessary to be controlled administratively for safe execution.
- (c) Contractor should obtain valid safety work permit before carrying out any hazardous job and shall maintain a copy of it with him through out the period of his work. Record of safety work permit should be maintained in a systematic manner. All the safety conditions and requirements stipulated in the safety work permit should be ensured strictly.
- (d) Contractor should ensure that only authorized personnel are deployed for hazardous works/jobs (refer item 3.11 for hazardous job) and provide facilities for the same.

9.11 Job Hazard Analysis

- (a) It should be ensured by contractor that a safe work procedure exists for all the hazardous jobs as mentioned hereunder and the requirements of the safety procedures are ensured at the work sites. Job hazard analysis (JHA) should form a part of such safe work procedures. A checklist based on JHA should be prepared. This checklist should be crosschecked by the line managers and verified by safety officer.

Typical list of jobs requiring job hazard analysis (This list is illustrative only and not exhaustive) is as follows:

- (i) Excavation
 - (a) Blasting including under water blasting
 - (b) Earth and stone removal/backfilling/dumping of earth/stones
 - (c) Any excavation more than 1.8 m depth.
- (ii) Work at height (working beyond 3.5 meters above ground)
 - (a) Erection and dismantling of scaffolding, platforms, shuttering/de-shuttering work

- (b) Dome work, rod bending, construction of chimney and cooling towers
 - (c) Working on tower crane.
- (iii) Materials and material handling
 - (A) Critical equipment handling e.g.
 - (a) Calandria
 - (b) Steam generators
 - (c) Turbine generator components
 - (d) Diesel generator set
 - (e) Generator stator
 - (f) End shields
 - (g) Fuelling machines components
 - (h) Heat transport pumps etc.
 - (B) Hazardous chemical handling e.g.
 - (a) Acids and alkalis
 - (b) Ammonia
 - (c) Chlorine
 - (d) Freon
 - (e) Hydrazine
 - (f) Hydrogen sulphide
 - (g) LPG
 - (h) Morpholine
 - (C) Movement of heavy material by crane
 - (D) Movement of tractor trolley on slopes
 - (E) Manual lifting of heavy material to height
 - (F) Erection of heavy machinery, equipment.
- (iv) Electrical connection
 - (a) Field connection for electrical installation
 - (b) Installation of lighting fixtures
 - (c) Charging of electrical system
 - (d) Charging of transformer, switch yard, switch gears
 - (e) Working near high voltage lines
 - (f) Use of portable electrical tools.

- (v) Equipment/structural erection work
 - (a) Material handling
 - (b) Loading and unloading
 - (c) Transportation of material from one place to other
 - (d) Steel fabrication and erection
 - (e) Cleaning and maintenance of batching plant equipment.
- (vi) Finishing/painting work
 - (a) Painting at height
 - (b) Painting in confined space.
- (viii) Other specific work
 - (a) Work with pneumatic tools/compressed air
 - (b) Work on pressure vessels/lines
 - (c) Work in the vicinity of steam lines
 - (d) Work in high enthalpy area
 - (e) Work in high noise area
 - (f) Work in confined space including tunnels and trenches
 - (g) Work in isolated area (away from main site)
 - (h) Radiography work
 - (i) Work related to welding, gas cutting, grinding
 - (j) Working near conveyor, rotating machine
 - (k) Leak detection testing.

9.12 Reward

- (a) To motivate the employees and organisation to work safely measures can be implemented based on the suitability. Selection and rewarding for the following categories may be considered on regular basis:
 - (i) Safest workmen
 - (ii) Safest supervisor
 - (iii) Safest area
 - (iv) Safest sub-contractor, etc.
 - (v) Sub-contractors and employees may be rewarded when the project achieves significant million man-hours without any lost time injury.

10. WORK SPECIFIC SAFETY MEASURES

10.1 General

- (a) The contractor should ensure that safety precautions are taken during the execution of awarded work and work areas are maintained safe at all times. At the end of each shift and at all times when the work is suspended, it should be ensured that the work area is left safe in such a way that no materials and equipment that can cause damage to existing property, personal injury or interfere with the other works of the project or station are left in an unsafe manner.
- (b) The contractor should ensure to provide and maintain all lights, guards, fencing, warning signs, caution boards and other safety measures and provide for vigilance as and when necessary for the protection of workers and for the safety of others. The caution boards should also have appropriate symbols.
- (c) Adequate lighting facilities such as floodlights, hand lights and area lighting should be provided at the site of work, storage area of materials and equipment and temporary access roads within the working area.
- (d) All works should be planned so as to avoid interference with other facilities, works of other contractors or sub-contractors at the site. In case of any interference, necessary coordination should be ensured for safe and smooth working.
- (e) It should be ensured that the instructions given by the safety officer or his designated nominee regarding safety precautions, protective measures, housekeeping requirements, etc. are complied with. The safety officer with due intimation to line manager should have the right to stop the work, if in his opinion, proceeding with the work will lead to an unsafe and dangerous condition. Line manager should arrange to get the unsafe condition rectified and/or provide appropriate protective equipment.
- (f) Contractor should ensure that each job with a hazard whether small or big is intimated to the Head, industrial safety of the facility well before it is taken up.
- (g) The contractor should be fully responsible for non-compliance of any of the safety measures or requirements, implications, injuries, fatalities, dangerous occurrences and compensation arising out of such situations or incidents.

- (h) Maximum duty hours of an individual should be as per the Factories Act 1948 or its latest amendment.
- (i) Illumination levels should be as per the statutory requirements.

10.2 Rock Blasting

- (a) All blasting operations should be carried out on the basis of procedures approved by Head, industrial safety and engineer-in-charge. All works in this connection should be carried out as per BIS specification/code (IS 4081: 1986. Title:- Safety code for blasting and related drilling operations (First Revision)). Barricades, warning signs etc. should be placed on the roads/open area.
- (b) Blasting permit should be obtained from Head, Industrial Safety at least one day before the blasting operation and precautions mentioned there in shall be ensured by the engineer-in-charge before blasting operation.
- (c) The blaster should have a licence from competent authority under Explosive Rules, 1983 for blasting work. It should also be ensured that he knows about the risks involved.
- (d) Blasting should be done under the supervision of competent engineer/supervisor.
- (e) Blasting in the open site should only be carried out during fixed hours every day/fixed day in the week between sunrise and sunset. Residents of adjacent area should be informed in advance about the blasting schedule.
- (f) No blasting should be undertaken during thunderstorm.
- (g) Necessary precaution should be taken to ensure the stability/integrity/safety of the adjacent structure by limiting the peak particle velocity.
- (h) No loose material, such as tools, drilling equipment, etc. should be left on the surface to be blasted. Proper muffling arrangement of the blasting area should be ensured to avoid flying of blasted material.
- (i) Authorized blaster should personally ensure that all the personnel/equipment has been removed from the blasting area before the blasting operations.
- (j) Blasting area should be free of detonating gas, inflammable objects, sparking or damaged wiring system, stray currents and static electricity.
- (k) All electrical lines in blasting area should be de-energised.
- (l) Entry of unauthorized personnel should be prevented by displaying warning signs.

- (m) In case of misfire, no person should be allowed to approach the blasting site unless it is inspected and cleared by a competent engineer/supervisor.
- (n) Explosives and blasting material should be stored only in clean, dry, well-ventilated, suitably constructed bullet/magazine which should be fire resistant and securely locked. Stock book should be kept accurate and maintained. Licence should be obtained for storage of explosive as per the Explosives Act, 1884.
- (o) Blasting caps, electric blasting caps or primers and detonators should not be stored in the same box, container or room with other explosives.
- (p) Precautions against lightening should be provided in accordance with Indian Electricity Rules, 1956 (amended in 2000).
- (q) The explosives should be transported in specially designed vehicles bearing a special sign or inscription entitled 'DANGER-EXPLOSIVES'. Also detonators separated from other explosive should be transported in a separate compartment.

10.3 Excavation, Trenching and Earth Removal

- (a) Before taking up excavation work, necessary permission should be obtained from the engineer-in-charge with reference to existing underground services.
- (b) The Line manager of the works should exercise full care to ensure that no damage is caused by him or his workmen, during the operation/excavation etc., to the existing water supply, sewerages, power or telecommunication lines or any other services or works. He should provide and erect before construction, substantial barricades, guardrails, and warning signs around the work area. He should also furnish, place and maintain adequate warning lights, display board, signals etc., as required.
- (c) All trenches 1.2 m or more in depth should at all times be supplied with at least one ladder for every 30 m along the trench. Ladders shall extend from bottom of the trench to at least 1 m above the surface of the ground.
- (d) The sides of the trench/pit in soil, which are 1.2 m or more in depth should be stepped back to give suitable slope (angle of repose) or securely held by timber bracing or appropriate shoring/support, to avoid the danger of soil slides from collapsing. The excavated material should not be placed within 1.5 m or half of the depth of the pit whichever is more from edges of the trench/pit. Cutting should

be done from top to bottom. Under no circumstances mining or undercutting should be done.

- (e) Workers should not be exposed to the danger of being buried by excavated material or collapse of shoring. Measures to prevent dislodgment of loose or unstable earth, rock or other material from falling into the excavation by proper shoring shall be ensured.
- (f) The stability and safety of the excavation, adjacent structures, services and other works should be ensured.
- (g) All excavated area should be fenced off by suitable railing and installation of caution board to warn the persons from slipping or falling into the excavation pit/ mound.
- (h) All excavated areas shall have an illumination level of at least 20 lux for night work and a red danger light shall be displayed at prominent place near the excavation site to warn approaching traffic and men.
- (i) For removal of earth from an earth mound/excavated heap a written permission should be obtained from the engineer-in-charge of the work. As far as practical, earth should be removed mechanically. Wherever manual removal of earth is involved, earth should be removed from the top by maintaining a slope equal to the angle of re-pose of the earth. Such work should be constantly supervised to ensure that no undercutting is done and to ensure that no person is trapped.
- (j) Dumping of excavated soil should be done at a specified area under proper supervision with respect to signaling, illumination and safety clearance.
- (k) It should be ensured that at a construction site of a building or other construction work, every vehicle or earth moving equipment is equipped with (a) silencers, (b) tail lights, (c) power and hand brakes, (d) reversing alarm (e) search light for forward and backward movement, which are required for the safe operation of such vehicle or earth moving equipment and (f) the cab of the vehicle or earth moving equipment is kept at least one meter from the adjacent face of a ground being excavated. (g) indicator etc.
- (l) It should be ensured that when a crane or shovel is traveling, the boom of such crane or shovel is in the direction of such travel and the bucket or scoop attached to such crane or shovel is raised and without load, except when it is traveling downhill.
- (m) Before loading or unloading power trucks or trailers attached to tractors, the brakes should be applied and if vehicle is on a sloping

ground, the wheels should be blocked. Handcart should not be used for the transfer of construction/erection materials in the construction area. However if the exigency demands urgent transfer of light materials a small handcart may be permitted with the prior approval of the Engineer-in-charge.

- (n) It should be ensured that at a construction site of a building or other construction work:
 - (i) All transport or earth moving equipment and vehicles are inspected at least once in a week by responsible persons and in case any defect is noticed in such equipment or vehicle, it is immediately taken out of service.
 - (ii) Safe gangways are provided for to and fro movement of building workers engaged in loading and unloading of lorries, trucks, trailers and wagons.
 - (iii) All earth moving equipment, vehicles or other transport equipment be operated only by such persons who are adequately trained and possess such skills as required for safe operation of vehicles or other transport equipment.
 - (iv) Trucks and other equipment are not loaded beyond their safe carrying capacity, which should be clearly marked on such trucks and other equipment.
 - (v) No unauthorised person rides the transport equipment employed in such work.
- (o) It should be ensured at a construction site of a building or other construction work that:
 - (i) A shovel or an excavator whether operated by steam or electric or by internal combustion used for such work is constructed, installed, operated, tested and examined as required under any law for the time being in force and the relevant national standards.
 - (ii) Buckets or grabs of power shovels are propped to restrict the movement of such bucket or grabs while being repaired or while the teeth of such bucket or grabs are being changed.
- (p) It should be ensured at a construction site of a building or other construction work that:
 - (i) An operator of a bulldozer before leaving - applies the brakes, lowers the blade and ripper and puts the shift lever into neutral.
 - (ii) A bulldozer is parked on level ground at the close of the work.

- (iii) The blade of a bulldozer is kept low when such bulldozer is moving uphill.
- (iv) Bulldozer blades are not used as brakes except in an emergency.
- (q) It should be ensured at a construction site of a building or other construction work that:
 - (i) A tractor and a scraper are joined safely at the time of its operation
 - (ii) The scraper bowls are propped while blades of such scraper are being replaced.
 - (iii) A scraper moving downhill is driven in low gear.
- (r) It should be ensured at a construction site of a building or other construction work that:
 - (i) Before a road roller is used on the ground, such ground is examined for its bearing capacity and general safety, especially at the edges of slopes such as embankments on such grounds.
 - (ii) A roller is not moved down hill with the engine out of gear.
- (s) Vehicle carrying excavated material should have proper cover over the driver's cabin.

10.4 Safe Means of Access/Platforms

- (a) Adequate safe means of access and exit should be provided for all work places, at all elevations.
- (b) Suitable scaffolds should be provided for workmen for all works that cannot be done safely from the ground, or from solid platform except such short duration work that can be done safely from ladders. Bamboo/wooden scaffolding should not be permitted.
- (c) Where the platform for working is more than 3.5 m above ground, the width of the platform should be minimum 1 m.
- (d) Ladder should be of rigid construction having sufficient strength for the intended loads. Wooden/bamboo/rope ladders should not be permitted. All ladders should be maintained in good condition. The ladders should be fixed to the ground or rigid platforms. An additional person should be engaged for holding the ladder, if ladder is not securely fixed. Ladder shall be extended from floor to at least one meter above the platform.

- (e) A portable ladder should be given an inclination not steeper than 1 in 4 (1 horizontal and 4 vertical). Ladders should not be used for climbing while carrying materials in hands. While climbing both the hands should be free.
- (f) Any working platform on scaffolding or staging more than 3.5 m above the ground or floor should have a guard rail attached, bolted, braced at least 1.0 m high above the floor or platform of such scaffolding or staging along with mid-rail.
- (g) The planks used for any working platform should not project beyond the end supports to a distance exceeding four times the thickness of the planks used. The planks should be rigidly fixed at both ends to prevent sliding, slipping or tilting. The thickness of the planks should be adequate to take load of men and materials and should not collapse. Plywood or packing wood should not be used as planks.
- (h) The guardrail should extend along the entire exposed length of the scaffolding with only such opening as may be necessary for the delivery of materials. Standard railing should have posts not more than 2 m apart and an intermediate rail halfway between the floor or platform of the scaffolding and the top rail. Such scaffolding or staging should be so fastened as to prevent it from swaying from the building or structure. Scaffolding and ladder should conform to IS 3696 (Part I): 1987 and (Part II): 1996.
- (i) Working platforms of scaffolds should have toe boards at least 15 cm in height to prevent materials from falling down.
- (j) A sketch of the scaffolding proposed to be used should be prepared and approval by the engineer-in-charge obtained prior to start of erection of scaffolding. All scaffolds should be examined by engineer-in-charge before use.
- (k) Working platform, gangways and stairways should be so constructed that they should not sag unduly or unequally and if the height of the platform or gangway or stairway is more than 3.5 m above ground level or floor level, they should have adequate width for easy movement of persons and materials and should be suitably guarded.
- (l) No single portable ladder should be used for access to a height of more than 4.5 m. For ladders up to 3m in length the width between styles (side bars)/width in the ladder should in no case be less than 300 mm. For longer ladders this width should be increased by at least 20 mm for each additional meter of length. Step/rungs spacing should be uniform and should not exceed 300 mm. Portable ladder should be used only for access to work place. In case work place is higher than 4.5 meters, pre-fabricated steel staircase should be used.

10.5 Work at Height

- (a) Person to work at height should be medically fit and should have height pass issued by safety section. (Appendix-D Part A, B and C). Safety training should be imparted before working at height.
- (b) Safety work-permit system for working at height should be obtained from industrial safety section.
- (c) At elevated places, secure access and foothold should be provided. Adequate and safe means of access and exit should be provided at all work places for all elevations. Means of access may be portable or fixed ladder, ramp or a stairway. The use of crosses, braces or framework, as a means of access to the working platform should not be permitted.
- (d) Linear movement at height should be reduced to minimum. In case of such movement provision for anchoring the safety belt should be made.
- (e) Where barricades cannot be installed, a safety net of adequate strength should be installed close to the level at which there is a danger of fall of personnel/fall of objects.
- (f) In case where 'work at height' is on asbestos roof, crawling board/ roof ladder should be used to walk across the asbestos roof.

10.6 Electrical Safety

- (a) All electrical installations shall comply with the appropriate statutory requirements given below and shall be subject to approval of the Electrical Engineer and Safety Officer.
 - (i) The Electricity Act, 2003
 - (ii) The Indian Electricity Rules 1956 (as amended in 2000)
 - (iii) The National Electricity Code 2008
 - (iv) Atomic Energy (Factories) Rules, 1996
 - (v) Other relevant rules of Statutory Bodies and power supply authority
 - (vi) Relevant standards of BIS

In addition to the above statutory provisions, the clauses indicated in this document shall also be complied.
- (b) It shall be the responsibility of the user seeking temporary power supply to indicate in writing, if any of the clauses (requirements

noted in above regulations and in this document) are conflicting with each other and for which the user cannot decide the course of action regarding safe installation, commissioning, operation, maintenance and decommissioning of the electrical installations.

- (c) The electrical engineer and safety officer of the agency providing temporary power supply shall interpret the concerned conflicting clauses and approve in writing the safe course of action.
- (d) The application Form-1 (Form-1A, 1B and 1C) as mentioned in Appendix-E should be submitted by the user for getting the temporary power supply.
- (e) After installation of temporary electrical panels, wiring works by the user, Certificates as per Form-1D (Appendix-E) should be submitted to the provider.
- (f) Certificate of safety officer and authorization of electrical engineer for energisation of temporary power supply should be filled as per Form-1E (Appendix-E).

10.7 Material Handling and Lifting Machines and Tackles

- (a) It should be made compulsory to supervise jobs like lifting/placing/loading/unloading/carrying/transporting etc. of heavy material by qualified supervisor having knowledge about hazards involved and precautions to be taken for such job.
- (b) The line managers should ensure that the material handling equipment used is adequate to handle the load.
- (c) Manual pulling of heavy equipment and trolley loaded with heavy material is not to be permitted.
- (d) Stacking and handling of heavy materials should be done on a firm ground to prevent settlement.
- (e) No lifting machine and no chain, rope or lifting tackle, except a fiber rope or fiber rope sling, shall be taken into use for the first time in that factory unless it has been tested and all parts have been thoroughly examined by a competent person. A certificate of such a test and examination specifying the safe working load or loads and signed by the person making the test and the examination has been obtained and is kept available for inspection.
- (f) Use of lifting machines and tackles should conform to relevant BIS requirements [IS 13367 (Part 1): 1992 Reaffirmed 2003, IS 4573: 1982 (Reaffirmed 2000) and IS 13834 (Part 1): 1994 Reaffirmed 2003 etc. The accessories and the attachments, anchorages and

supports etc. should be ensured in healthy conditions by regular inspections at defined frequencies.

- (g) Every rope used in hoisting or lowering materials or as a means of suspension should be of good quality and adequate strength and free from any defect. This should be ensured by regular inspection as per IS 2762: 1982- Specification for wire rope slings and sling legs (first revision).
- (h) Every crane operator or lifting appliance operator should be authorized. No person under the age of 18 years should be in charge of any hoisting machine or give signal to an operator of such machine.
- (i) In case of every lifting machine (and of every chain, ring, hook, shackle, swivel and pulley block used in hoisting or as a means of suspension) the safe working load should be ascertained and clearly marked. In case of a lifting machine having a variable safe working load, each safe working load and the conditions under which it is applicable should be clearly indicated. No part of any machine should be loaded beyond the safe working load except for the purpose of testing. This should be approved by the engineer-in-charge and Head, Industrial Safety.
- (j) In case of facilities machines, the safety of the machines shall be ensured by the Engineer-in-charge. As regards the Contractor's machines, the contractor should declare the safety of the machine to the Engineer-in-charge whenever he brings any machinery to site of work and get it verified by the engineer-in-charge, supported by a valid test certificate by the competent person.
- (k) Thorough inspection and load testing of lifting machines and tackles should be done in the presence of competent person at least once in every 12 months and records of such inspections and testing should be maintained.
- (l) No mobile crane should be allowed to move under live high-tension power transmission line.
- (m) While lifting loads, cranes should be located on level ground.
- (n) A thorough load analysis should be carried out before using cranes in tandem.
- (o) Motors, gear transmission, couplings, belts, chain drives and other moving parts of hoisting appliances should be provided with adequate safeguards. Hoisting appliances should be provided with such means, which will reduce the risk of any part of a suspended load becoming accidentally displaced or lowered.

- (p) It should be ensured that the cabin of the lifting machine in outdoor service:
 - (i) is made of fire resistant material,
 - (ii) has a suitable seat, a footrest and protection from vibration,
 - (iii) affords the operator an adequate view of the area of operation,
 - (iv) affords the operator adequate protection against the weather, and
 - (v) is provided with fire extinguisher.

10.8 Welding and Gas Cutting

- (a) Welding and gas cutting operations should be done by qualified and authorized persons only.
- (b) Safety work permit shall be obtained (wherever necessary like presence of flammable or combustible material etc.) before flame cutting/welding is taken up.
- (c) Welding and gas cutting should not be carried out in places where flammable or combustible materials are kept and where there is danger of explosion due to presence of gaseous mixtures. In case the requirement cannot be avoided, specific approval and procedure should be ensured and adequate precautions should be taken.
- (d) Welding and gas cutting equipment including hoses and cables should be maintained in good condition.
- (e) Barriers should be erected to protect other persons from harmful rays from the work. When welding or gas cutting is done in elevated positions, precautions should be taken to prevent sparks or hot metal falling below on persons or combustible materials.
- (f) Suitable type of protective clothing consisting of fire resistant gauntlet gloves, leggings, boots and aprons should be provided to workers as protection from heat and hot metal splashes. Face shields with filter glasses of appropriate shade should be worn.
- (g) Adequate ventilation should be provided while welding, brazing and cutting the metals like zinc, brass, bronze, galvanised or lead coated material.
- (h) Welding and gas cutting on drums, barrels, tanks or other containers should be taken up only after ascertaining that they have been emptied, cleaned thoroughly and made free of flammable material.
- (i) Fire safety measures should be available as required near the location of welding/cutting operations.

- (j) Flash back arrestor should be provided with gas cutting and gas welding sets.
- (k) For electric (Arc) welding the following additional safety precautions should be taken:
 - (i) When electrical welding is undertaken the return lead of welding machine should be directly connected to the job invariably.
 - (ii) Provision must be in place in electric welding machine to prevent physical contact with live parts.
 - (iii) The welding cables and power cables should be routed separately to avoid entanglement.
 - (iv) The electric welding set should have suitable earth connections. There should be an electrical isolation device in the input power supply side on the welding machine.
- (l) Double gauges should be used for all gas cylinders used for cutting/welding. Pressure gauges/regulators should be in healthy condition.

10.9 Rotary Cutters/Grinders

- (a) All portable cutter/grinders should be provided with the wheel guard in position.
- (b) Grinding wheels of specified diameter only should be used on all grinders in order to limit the prescribed peripheral speed.
- (c) In pedestal grinder, the gap between tool rest and grinding wheel should be maintained less than 3 mm.
- (d) Goggle/face shield should be used during grinding operation.
- (e) No grinding wheel should be used after its expiry date.
- (f) Ear muff/ear plug should be used during the welding /cutting jobs.
- (g) Portable appliances, which are powered by single phase AC supply, shall be provided with three-core cable and three pin plug, otherwise the whole body should be double insulated.
- (h) Safety work permit should be obtained (wherever necessary like presence of flammable or combustible material etc.) before grinding is taken up.
- (i) Fire safety measures should be available as required near the location of grinding operations.

10.10 Concrete Mixing Equipment

- (a) Cement bags should be stacked on wooden planks in dry and leak proof area, 150 mm to 200 mm from the floor and 450 mm away from walls. Height of the stack should not be more than 15 bags or 1.5 meters whichever is lower. Width of the stack should not be more than 4 bags or 3 meters. Lateral loading of the walls of the storage room by stacking should not be permitted. Stacking of the bags should not be used as a working platform.
- (b) Shuttering and supporting structures should be of adequate strength and approved by engineer-in-charge. This should be ensured before concrete is poured.
- (c) If the mixer has a charging skip the operator should ensure that the workmen are out of danger before the skip is lowered.
- (d) Adequate walking platforms are to be provided in the reinforcement area to ensure safe walking for pouring concrete on the roof.
- (e) When workmen are working/cleaning the inside of the drum of mixer, the power of the mixer should be switched off and 'Do not operate' tag should be provided. The plant operation and cleaning of mixing pan should be carried out as per equipment supplier's instructions.
- (f) Interlocks between the cover and the mixer rotor shall be established to ensure that the agitator does not start when the cover is in open condition.
- (g) It should be ensured that moving parts of the elevators, hoists, screens, bunkers, chutes and grouting equipment used for concrete work and of other equipment used for storing and transporting of ingredients of concrete are securely fenced to avoid contact of workers with such moving parts.
- (h) It should be ensured that screw conveyors used for cement, lime and other dusty material are completely enclosed.
- (i) Workers engaged for handling bulk cement in a confined place should be provided with tight fitting goggles, approved respirators and protective clothing, which will fit snugly around the neck, wrist and ankles.
- (j) The following should be ensured for every pipe carrying pumped concrete:
 - (i) The scaffolding carrying a pipe for pumped concrete should be strong enough to support such pipe at a time when such pipe is filled with concrete or water or any other liquid and to bear safely all the building workers who may be on such scaffold at such time.

- (ii) Securely anchored at its end point and each curve on it.
 - (iii) Provided with an air release valve near the top of such pipe; and securely attached to a pump nozzle by a bolted collar or other adequate means.
- (k) The following should be ensured while using the electric vibrators in concreting work at a construction site of a building or other construction work such that:
- (i) Such vibrators are earthed.
 - (ii) The leads of such vibrators are heavily insulated.
 - (iii) The current is switched off when such vibrators are not in use.

10.11 Painting

- (a) Appropriate breathing air respirators should be provided for use by the workers when paint is applied in the form of spray, or a surface having lead paint is dry rubbed or scraped.
- (b) Only the quantity of paint, thinner and polish required for the day's work should be kept at the work spot. Excess storage should not be permitted at the work spot.
- (c) Smoking, open flames or sources of ignition should not be allowed in places where paints, varnish, thinner and other flammable substances are stored, mixed or used. A caution board, with the instructions written in national language and regional language, 'SMOKING - STRICTLY PROHIBITED' should be displayed in the vicinity where painting is in progress or where paints are stored. Symbols should also be used on caution boards.
- (d) All electrical equipment of paint storage room should be of explosion proof design. Suitable fire extinguishers / sand buckets should be kept available at places where flammable paints are stored, handled or used.
- (e) When painting work/hot resin mix is done in a closed room or in a confined space, adequate ventilation should be provided and ensured. In addition, suitable respirators should be provided. No portable electric light or any other electric appliance of voltage exceeding 24 volts should be permitted for use inside any confined space. Walkie-talkie or other means of communication should be provided. Rescue arrangement like full body harness with lifeline, tripod with pulley and extra BA sets should be available.

- (f) The workers should use PVC gloves and/or suitable barrier creams to prevent the skin contact with Epoxy resins and their formulations used for painting.

10.12 Demolition

- (a) Before any demolition work is commenced and also during the progress of the work, all roads and open area adjacent to the work site should either be closed or suitably cordoned. Appropriate warning signs should be displayed for cautioning approaching persons/vehicles.
- (b) Before demolition operations begin, it should be ensured that all the service lines are de-energized.
- (c) Persons handling demolition operations shall use appropriate PPE.
- (d) All demolition operations should be carried out with safe and duly approved procedures which shall include following but not limited to:
 - (i) No masonry/material should be permitted to fall in such masses or volume or weight so as to endanger the structural stability of any floor or structural support.
 - (ii) No wall, chimney or other structure or part of a structure is left unguarded in such a condition that it may fall, collapse or weaken due to wind pressure or vibration.
 - (iii) No floor roof or other part of the building should be overloaded with debris or materials as to render it unsafe.
- (e) After the demolition, the debris and other materials collected should be disposed safely and not permitted to be dropped freely.
- (f) Entries to the demolition area shall be restricted to authorized persons wearing safety helmets and safety shoes.

10.13 Traffic

- (a) All the vehicles moving at sites should conform and comply with the requirements of Motor Vehicles Act, 1988 and the Rules made thereunder. All the drivers /operators of vehicles should possess valid driving license as per Motor Vehicles Act, 1988 or its latest amendment.
- (b) When the construction work causes interference with traffic such as road cutting or transit unloading of heavy equipment etc. notice of such interference should be given to the engineer-in-charge and Head, industrial safety well in advance with the details of start of the work and time required.

- (c) A cleaner/assistant must be available for all heavy vehicles whenever vehicles move forward as well as in the reverse direction. All vehicles should be fitted with proper reverse horns, back view mirrors and indicator signals.
- (d) Facility shall ensure that the assessment of the driver's visual ability is carried out as per Rule 55 of the Atomic Energy (Factories) Rules, 1996/guidelines of advisory committee on occupational health (ACOH), AERB or as per the latest amendments in statutes.
- (e) Effective speed breakers with yellow stripes on the roads to regulate the speed at the vulnerable points should be installed. Effective barricading with adequate caution signs should be placed to warn the vehicle drivers whenever the jobs are carried out on the road.
- (f) All vehicles moving at the site should have roadworthiness certificate issued by the concerned authority.
- (g) Special limit boards and caution boards indicating turns should be installed wherever necessary.
- (h) In general, the following maximum speed limits should be specified and implemented. Vehicles speed limits should be as per Motor Vehicle Act or 20 Km/h. Extra precautions and care should be exercised particularly during heavy material/equipment movements.
- (i) Safety awareness programmes should be conducted for all the drivers of the light, medium and heavy vehicles.

10.14 Work in Radiation Area

The facility shall follow the stipulations under Atomic Energy (Radiation Protection) Rules, 2004 and AERB Safety Manual on 'Radiation Protection for Nuclear Facilities'[AERB/NF/SM/O-2 (Rev.4)] with regard to work in the radiation area and other works related with radiography, etc.

10.15 Work in and Around Water Bodies

- (a) When work is done at a place where there is risk of drowning, all necessary rescue equipment such as life buoys and life jackets should be provided and kept ready for use.
- (b) All necessary steps shall be taken for prompt rescue of any person in danger and adequate provision should be made for prompt first-aid treatment of all injuries likely to be sustained during the course of the work. Proper record of entry/exit to and from water bodies shall be maintained on shift basis and search operation shall be conducted as soon as any person is detected to be missing.

- (c) Caisson Work
 - (i) Safe means of access should be provided to the place of work in the caisson and adequate means should be provided to safely reach the top of caisson in the event of inrush of water.
 - (ii) The work relating to construction, positioning, modification or dismantling of caisson shall be done under the supervision of a responsible person.

10.16 Fire Safety

- (a) Provisions prescribed in the AERB safety standard on 'Fire Protection Systems for Nuclear Facilities', [AERB/NF/SS/FPS (Rev. 1)] shall be complied.
- (b) All necessary precautions should be taken to prevent outbreak of fires at the construction site. It should be ensured that all hot works are carried out under valid work permit.
- (c) Combustible materials such as wood, cotton waste, oil, coal, paints, chemicals etc., should be segregated and kept to the required bare minimum quantity at work place.
- (d) Containers of paints, thinners and allied materials should be stored in a separate room which should be well ventilated and free from excessive heat, sparks, flame or direct rays of the sun. The containers of paint should be kept covered or properly fitted with lid and should not be kept open except while using.
- (e) Adequate number of trained persons from approved fire training centre required to extend fire safety coverage should be ensured.
- (f) Fire extinguishers as approved by the engineer-in-charge/in-charge of fire station/safety in-charge should be located at the construction site at appropriate places.
- (g) Adequate number of trained workmen in fire fighting who can operate fire extinguishers should be ensured.
- (h) Portable fire extinguishers with periodic inspection, maintenance and re-filling complying with the mandatory requirements should be ensured.
- (i) Availability of adequate water for fire fighting should be ensured.
- (j) Implementation of the provisions of various statutory licenses for storing gas cylinders, petroleum products, explosives etc. as per the relevant Acts and Rules should be ensured wherever required.

10.17 Environmental Safety

Relevant provisions of the state/central statutory authority regarding environment protection should be adhered to.

10.18 Public Protection

The Contractor should make necessary provisions to protect the public. He should be bound to bear the expenses in defense of every action or other proceedings at law that may be brought by any person for injury sustained owing to neglect of any precaution required to be taken to protect the public. He should pay for the any such damage and cost which may be awarded in any such suit, action or proceedings to any such person, or the amount, which may be fixed as a compromise by any such person.

10.19 Safety of Visitors

- (a) Visitors for the project shall be given health and safety induction before they are allowed in to the construction project. It shall include the minimum PPE to be used, hazards and risks at the work area, restricted areas of entry, emergency response arrangements, etc.
- (b) Visitors shall always be accompanied by one of the employees of the project site.
- (c) Visitors shall not be allowed in the hazardous areas unless they are competent and trained to work in such areas.

10.20 Housekeeping

- (a) It should be recognized that a proper place for everything and everything in its place is maintained for a good housekeeping.
- (b) The material required for immediate use only should be brought to the designated workplace and stacked properly and labeled suitably.
- (c) All work spots, site office and surroundings should all times be kept clean and free from debris, scrap, concrete muck, surplus materials and unwanted tools and equipment. A day-to-day collection and disposal of scraps/debris should be done safely at designated place.
- (d) Electrical cables should be so routed as to allow safe traffic by all concerned. Cable should be preferably supported on the brackets fixed along the wall to maintain safe access. Wherever routing on the floor cannot be avoided, care should be taken to ensure mechanical protection of these cables and safe access is not disturbed.
- (e) No material at any work place should be so stacked or placed or disposed off as to cause danger, inconvenience or damage to any person or environment.

- (f) All unused scaffoldings, surplus/scrap materials and equipment/ systems like temporary electrical panels etc. should not be allowed to accumulate and shall be removed from the premises at the earliest.
- (g) Accumulation of water /oil spillages on the floor or any other workplace should be avoided.
- (h) Proper aisle space marking should be provided in all workplaces.

10.21 Other Statutory Provisions

Notwithstanding the clauses in the above subsections, there is nothing in these clauses to exempt the contractor from the provisions of any other Act or Rules in force in the Republic of India. In particular, all operations involving the transport, handling, storage and use of explosives should be as per the standing instructions and conform to the Indian Explosives Act, 1884 and the Explosives Rules, 1983. Handling, transport, storage and use of compressed gas cylinders and pressure vessels should conform to the Gas Cylinder Rules 2004 and Static and Mobile Pressure Vessels (Unfired) Rules 1981. In addition, The Indian Electricity Act 2003 and Indian Electricity Rules 2005, the Atomic Energy Act, 1962, the Radiation Protection Rules, 2004, the Atomic Energy (Factories) Rules, 1996 and AERB safety manual on 'Radiation Protection for Nuclear Facilities' [AERB/NF/SM/O-2 (Rev.4)] should be complied with.

11. PERSONAL PROTECTIVE EQUIPMENT

11.1 General

Although the primary approach in any safety effort is that the hazard to the workmen should be eliminated or controlled by engineering methods rather than protecting the workman through use of personal protective equipment (PPE). Engineering methods could include design change, substitution, ventilation, mechanical handling, atomization etc. Under those situations when it is not possible to introduce any effective engineering methods for controlling hazards, it is necessary that workman use appropriate type of PPE. For example, in construction work there is the possibility of a hand tool, a bolt, or some loose material to fall from an elevated level and striking the head of workman working below. It is therefore necessary that construction worker wear a safety helmet. It is for such situations, both the Factories Act 1948 and the Atomic Energy (Factories) Rules, 1996 have provisions for use of appropriate type of PPE.

It is thus recognized that use of PPE is an important and necessary consideration in the development of a safety programme. Once the safety professional decides that PPE is to be used by workmen, it is essential to select right type of PPE and construction agency should ensure that workman uses it and also PPE is correctly maintained.

11.2 Personal Protective Equipment (PPE)

- (a) All personal protective equipment as considered necessary should be made available for the use of the persons employed on the site and maintained in a condition suitable for immediate use. Also adequate steps should be taken by line manager to ensure proper use of PPE.
- (b) All the PPEs in use should be as per relevant IS standards as referred in the AERB safety guidelines on 'Personal Protective Equipment' (AERB/SG/IS-3).
- (c) All persons employed at the construction site should use safety helmets. Safety helmet should be with BIS mark and should have its headband with back support and chin strap.
- (d) Workers employed on mixing asphaltic materials, cement and lime mortars should use protective goggles, protective foot wears, hand gloves and respirators as required.
- (e) Persons engaged in welding and gas-cutting works should use suitable welding face shields. The persons who assist the welders should use suitable goggles. Protective goggles should be worn while chipping and grinding.

- (f) Stonebreakers should use protective goggles. They should be seated at sufficiently safe distances from one another.
- (g) Safety goggles should be of shatterproof type and with zero power.
- (h) Persons engaged in or assisting in shot blasting operations and cleaning the blasting chamber should use suitable gauntlets, overalls, shatterproof and dust-proof goggles and self contained breathing apparatus set.
- (i) All persons working at heights more than 3.5 m above ground or floor and exposed to risk of falling down should use full body harness safety belts, unless otherwise protected by cages, guard railings, etc. In places where the use of safety belts is not feasible, suitable net of adequate strength fastened to substantial supports should be used.
- (j) When workers are employed in sewers and inside manholes that are in use, it should be ensured that the manholes are opened and are adequately ventilated at least for an hour. After it has been well ventilated, the atmosphere inside the space should be checked for the presence of any toxic gas or oxygen deficiency by a competent person and recorded in the register before the workers are allowed to get into the manholes. A pilot team should enter the area donning self contained breathing apparatus (SCBA). The manholes opened should be cordoned off with suitable railing and provided with warning signals or caution boards to prevent accidents. There should be proper illumination in the night. Depending upon the work situation, the contractor should provide PPE including the SCBA as recommended by Head, industrial safety.

12. MEDICAL MANAGEMENT

12.1 General

- (a) The contractor shall make arrangements for the first aid and medical services for the injured or ill persons for prompt attention or aid.
- (b) The arrangement can be made by the contractor or an agreement can be in vogue with the facility.
- (c) The medical facilities at first-aid centre shall be adequate to immediately cater to the injured based on the hazard potential and probable severe injuries.
- (d) The first-aid centre shall be provided with the adequate equipment and medicines for catering to the site requirements. The first-aid centre shall be manned depending on the working hours / on round the clock shift basis. The services of at least one qualified medical practitioner (medical officer) shall be made available by the contractor.

12.2 Medical Facilities

- (a) Medical facilities conforming to the provisions of the Atomic Energy (Factories) Rules, 1996 should be provided at all work sites.
- (b) The requisite medical facilities in the form of a well-equipped first aid centre manned by qualified nursing personnel should be provided at all work sites. Contractor may avail this facility as per terms and conditions of the contract.
- (c) In addition, well-maintained first-aid boxes should be kept at each location of the work by the contractor and availability of the personnel trained in first aid should be ensured.
- (d) A manned and equipped ambulance should be available at work site during the working hours/on round-the-clock shift basis.
- (e) It should be ensured by the facility that occupational health monitoring of contract workers is carried out as per provisions of the Factories Act 1948 as per the latest amendment and the stipulations/directives given by Atomic Energy Regulatory Board from time to time.
- (f) Display of emergency contact numbers of important persons and hospitals and route map of site shall be maintained at designated places.

12.3 Medical Management of Serious Injuries

- (a) In case of serious injuries, the injured should be shifted to the nearest first-aid centre at site immediately. The opinion of medical officer/certifying surgeon should be sought immediately for medical management.
- (b) After providing the first aid treatment the injured should be shifted to designated medical facility of the site/hospital for further medical assistance, in an ambulance along with a nursing attendant.
- (c) The doctor at the medical facility of the site/hospital attending the case shall assess the extent of injuries and render immediate medical aid. If the situation warrants trauma/special care the injured shall be shifted to the referral hospital, having all the requisite facilities for specialized treatment in ambulance along with a medical attendant.
- (d) A list of such referral hospitals for specialised medical management facilities for the injured persons should be available with the project management/Head, industrial safety and Head, medical services of the site for ready reference.

APPENDIX-D

APPLICATION FOR HEIGHT PASS

PART- A

Group/Section: _____

Agency: _____

1. Applicant's name : _____
2. Facility address : _____
3. Residential address : _____
4. Age : _____
5. Sex : _____
6. Height : _____
7. Gate Pass No. : _____
8. Name of contractor/agency with whom engaged at present : _____
9. Height pass required for work at _____ m. Height
10. Description of present job : _____
11. Previous experience of working at height : _____

S.No.	Name of the employer	Duration of employment	Work experience
1.			
2.			

12. Does the applicant suffer from any of the following ailments ?
(If yes details to be given):
- (a) Blood pressure _____ (b) Epilepsy _____
- (c) Flat foot _____
- (d) Frequent headache or reeling sensation _____
- (e) Mental depression _____ (f) Limping gait _____
- (g) Aerophobia _____

Declaration:

I hereby declare that the above information furnished by me is true and correct. I shall always wear the safety belt and tie the life-line whenever working at unguarded heights of 3 m and above. I shall not misuse the height pass issued to me or transfer it to any other person. I shall never come to duty or work at height/depth under the influence of alcohol/drugs.

Date:

Name:

Sign:

(Applicants Name and Signature or loss time injury (L.T.I) in case he cannot sign. In case of LTI an authorised person shall explain each point/item to the individual and certify on that behalf below the LTI)

I certify that I am satisfied with the above certification of the individual for the application of height pass and request for issue of height pass to him.

Name :

Sign:

(Agency Concerned)

Countersigned by:

Section Head (Facility)

PART-B

MEDICAL FITNESS CERTIFICATE

Certified that I, Dr. _____ have examined Shri. _____
_____ aged _____ on (date) _____ who has signed below in
my presence. General and physical examinations of Shri. _____
do not reveal any abnormality. He does not suffer from any acute/chronic skin disease
or any contagious or infectious disease. His eye sight is normal with/without glasses.
In my opinion, Shri. _____ is physically and mentally fit for
working at height.

Details of examinations are given below:

Personal attributes:

1. Height : _____
2. Chest : _____
3. Weight : _____
4. Hearing : _____
5. Sight : _____
6. Skin : _____
7. Heart beating: _____

Medical aspects:

1. Urine : _____
2. Blood pressure : _____
3. Epilepsy : _____
4. Flat foot : _____
5. Frequent headache
or reeling sensation: _____
6. Mental depression: _____
7. Limping gait : _____
8. Aerophobia : _____

Name:

Signature of workman

Signature and Rubber Stamp of
Medical Practitioner with
Reg. No.

PART-C

INDUSTRIAL SAFETY SECTION

(Considering the above medical certificate, the applicant has appeared on the following practical tests conducted by industrial safety section and the results are given below (strike off whichever is in-applicable))

- (a) Wearing a safety belt and tying the rope knot : Pass/fail
- (b) Walking over a horizontal structure at 3 m. : Pass/fail
height wearing a safety belt
- (c) General physique (OK/Not OK)

The above applicant's performance in the above tests has been satisfactory/unsatisfactory due to the following.

So I certify and issue this height pass to Shri. _____
with Registration No. _____ in the height pass register. This is valid for one
year from the date of issue i.e. up to

Date:

Name:

Signature

Scientific Assistant (Safety)

Safety Officer

APPENDIX-E

FORM - 1

APPLICATION FOR TEMPORARY POWER SUPPLY AND USE OF ELECTRICITY AT WORK SITE DURING CONSTRUCTION [Prescribed under clause 10.6(d)]

1.	Name and address of user.	
2.	Reference of tender or work order (if applicable)	:
3.	Name and designation of tender/work order issuing authority.	:
4.	Power supply application number [†]	:
5.	Name and designation of tender/work order/work supervising authority (engineer-in-charge).	:
6.	Expected date of commencement of temporary supply	:
7.	Expected date of decommissioning of temporary supply	:
8.	Voltage level (LV/MV/HV)	
9.	Type of connection (1Ph/3Ph)	
10.	Connected load (Kw)	
11.	Maximum demand(KVA)/Power factor	
12.	Single line diagram* of proposed power distribution scheme along with equipment data sheet (downstream installation after point of connection).	Enclosed (Form-1A)/Not enclosed
13.	Name of overall supervisor and available qualified Staff	Enclosed (Form-1B)/Not enclosed
14.	Auxiliary equipment data sheet (meters, fire extinguisher, first aid box etc)	Enclosed (Form-1C)/Not enclosed
15.	Name and designation of provider's representative to whom the application is addressed.	:
16.	Name and designation of authorised signatory of user, who had submitted this application	:

[†] Power supply application number shall be different for same user with multiple applications for temporary supply

* All the drawings and tables shall be signed by user's representative indicated against 16 above.

Signature of authorised signatory of user

Signed endorsement of work order
supervising authority indicated
against 5 above.

FORM - 1A

EQUIPMENT DATA SHEET FOR OBTAINING TEMPORARY POWER SUPPLY AND USE OF ELECTRICITY AT WORK SITE DURING CONSTRUCTION

(Prescribed against item-12 of form-1)

Name and address of user:

Power supply application

Number:

Amendment No:

References:- Single line diagram (SLD) of the power distribution scheme with all equipment details (attach the SLD)

1. Identity	2. Type	3. Make and model	4. Manufacturer's S.No	5. Fixed/ Portable	6. Size	7. Last used date	8. Last test date	9. Latest test data	10. Rating

Signature of authorised signatory of user

Explanation of column headers:

1. Identity:- Identification mark/number/tag of equipment in single line drawing and layout drawing. Every equipment in single line drawing and layout drawing shall have suitable identification mark/number/tag.
2. Type:- Cable/CB/MCB/MCCB/ELCB/transformer/lightning arrestor/earthing station/earthing connection/motor/lighting fixture/switch/fuse/switch, socket box etc.
3. Make and model:- manufacturer's name and corresponding model no.
4. Manufacturer's S. No:- serial number and date in name plate if available. Else NA
5. Fixed/portable:- Equipment is installed/laid/anchored to surface or portable.
6. Size:- depending upon type of equipment and as desired by provider representative e.g. length for cables or all dimensions if heavy equipment like transformer.
7. Last used date. date of last use else NEW
8. Last test date. latest test date by user or by manufacturer if NEW
9. Latest test data:- IR, HV, resistance, functional test data depending upon the type of equipment as desired by provider's representative.
10. Rating:- name plate rating of equipment like voltage, current, power (apparent, active, reactive), IP of enclosure, size (cable cross section) etc. depending upon the type of equipment and as desired by provider's representative.

FORM - 1B**STAFF DATA SHEET FOR OBTAINING TEMPORARY POWER SUPPLY
AND USE OF ELECTRICITY AT WORK SITE DURING CONSTRUCTION
(Prescribed against item-13 of form-1)**

Name and address of user:

Power supply application**Number:****Amendment No:-**

1. Name	2. Address	3. Tel.No.	4. Responsibility	5. Certification detail	6. Resuscitation training	7. Expe- rience	8. Other relevant training	9. Signature

Signature of authorised signatory of user

Explanation of column headers:

1. Name:- Name of agency/person
2. Address:-
3. Tel No:- regular, alternate and emergency telephone numbers
4. Responsibility:- whether responsible for installation, operation, maintenance, overall supervision etc. overall supervisor shall be indicated specifically.
5. Certification detail:- (a) type of certification e.g wire man license, electrical supervisor license, electrical contractor license, diploma in electrical engineering, degree in electrical engineering etc. (b) certifying agency e.g. state PWD, central PWD, CEA, name of college/university etc. (c) certificate/license number with date. (d) valid up to date or next renewal date must for contractor/supervisor license.
6. Artificial resuscitation training:- indicate YES/NO if the staff is trained to apply artificial resuscitation technique.
7. Experience:- number of years of experience.
8. Other relevant training :- any other training in electrical/ safety course. Indicate name of training, duration (days/months), training providing agency.
9. Signature:- original signature of individual.

FORM - 1C

**AUXILIARY EQUIPMENT DATA SHEET FOR OBTAINING
TEMPORARY POWER SUPPLY AND USE OF ELECTRICITY
AT WORK SITE DURING CONSTRUCTION
(Prescribed against item-14 of form-1)**

Name and address of user:

Power supply application**Number:****Amendment No:-****Reference:- Layout drawing No. / _____**

1. Identity	2. Type	3. Make and model	4. Manufacturer's S. No	5. Fixed/ Portable	6. Size	7. Last used date

Signature of user's representative

Explanation of column headers:

1. Identity:- identification mark/number/tag of equipment in layout drawing.
2. Type:- earthing rod/megger/multi meter/earth resistance meter/fire extinguisher/s and bucket/first aid box/resuscitation chart/rubber mat etc.
3. Make and model:- manufacturer's name and corresponding model no.
4. Manufacturer's S. No:- serial number and date in name plate if available. Else NA
5. Fixed/portable:- equipment is installed/laid/anchored to surface or portable.
6. Size:- depending upon type of equipment and as desired by provider representative.
7. Last used date. NEW for new equipment. NA for passive devices like chart/mat etc.

FORM -1D

(Prescribed under clause 4.6(e)]

Name of user agency

Power supply application number:-

CERTIFICATE BY THE LICENSED ELECTRICAL CONTRACTOR

Certified that subject installations have been carried out by us or checked by us and is in accordance with I.E. Rules. The documents submitted with subject temporary power supply application (Form-1) is verified by us and the complete installation confirms to these documents.

We shall periodically inspect/check the installation so that no unsafe situation arises during use of this temporary power supply system. We understand that for the entire duration of existence of this temporary power supply system we shall be responsible for any unsafe installation, operation, maintenance, testing of the same which results into any loss of life or material. We shall immediately report to the provider's representative and ensure de-energisation of supply if any unsafe situation arises during use of this temporary power supply system.

Signature of the authorised signatory of licensed electrical contractor

Rubber seal of licensed electrical contractor

Date

CERTIFICATE BY THE USER

Certified that my/our installations have been carried out in accordance with the I.E. Rules and that I/We have employed competent agency/staff to handle the installations which is strictly as per the staff data sheet submitted in Form-1B.

We understand that for the entire duration of existence of this temporary power supply system we shall be responsible for any unsafe installation, operation, maintenance, testing of the same which results into any loss of life or material. We shall immediately report to the provider's representative and ensure de-energisation of supply if any unsafe situation arises during use of this temporary power supply system.

Signature of the authorised signatory of user

Name of signatory

Date

FORM -1E

[Prescribed under clause 10.6(f)]

CERTIFICATE BY THE SAFETY OFFICER

Certified that I have inspected the electrical installation referred here in after satisfying myself about the safe condition of the installation, I hereby recommend that the service connection be given to the contractor.

Signature of the safety officer

Name:

Date:

AUTHORISATION BY THE ELECTRICAL ENGINEER

The subject power supply application along with completed installation, necessary certificates (as per Form-1 of Appendix-E) is scrutinised by us. The proposal found to be in order and the installation can be energised on _____ in presence of your designated overall supervisor as indicated in Form-1B. Enclosed herewith the test report data sheet Form-1F. You are requested to carry out the periodic testing of equipment and submit the test report periodically as per this form.

Signature of the electrical engineer
of provider

Name of signatory

Date

FORM - 1F

**TEST/MAINTENANCE REPORT DATA SHEET OF EQUIPMENTS OF
TEMPORARY POWER SUPPLY SYSTEM AT WORK SITE DURING
CONSTRUCTION
(Prescribed against form-1E)**

Name and address of user:

Power supply application**Number:****Amendment No:-**

1. Identity	2. Type	3. Last tested date	4. Next due date of any test	5 Frequency of IR test	6 Frequency of HV test	7. Frequency of earth resistance test	8. Other tests

Signature of electrical engineer of provider

Explanation of column headers:

1. Identity:- Identification mark/number/tag of equipment in single line drawing and layout drawing. Every equipment in single line drawing and layout drawing shall have suitable identification mark/number/tag.
2. Type:- Cable/CB/MCB/MCCB/ELCB/transformer/lightning arrestor/earthing station/earthing connection/motor/lighting fixture/switch/fuse/switch, socket box etc.
3. Last test date: - latest test date indicated in Form-1A.
4. Next due date of any test:- as worked out by frequency of tests indicated in subsequent columns.
5. Frequency of IR test:- required frequency depending upon type of equipment and location of installation. NA if not required after installation.
6. Frequency of HV test:- required frequency depending upon type of equipment and location of installation. NA if not required after installation.
7. Frequency of earth resistance test:- required frequency depending upon type of equipment and location of installation. NA if not required after installation.
8. Other tests:- name and description of any other essential tests/maintenance activity and required frequency depending upon type of equipment and location of installation. NA if not required after installation.

BIBLIOGRAPHY

1. The Atomic Energy (Factories) Rules, 1996
2. The Building and Other Constructions Workers' (Regulation of Employment and Conditions of Service) Central Rules, 1998
3. Regulatory control of the use of contractors by operating organisations (Peer discussions on regulatory practices), IAEA, 2000
4. Bureau of Indian Standards, Guidelines for construction project management: Part 5 Health and Safety Management, Draft copy, 2011
5. Indian Standard 3696(Part 1), Safety code of scaffolds and ladders: Part 1 Scaffolds, 1987
6. Indian Standard 3696(Part 2), Safety code of scaffolds and ladders: Part 2 Ladders, 1991
7. Indian Standard 3764, Code of safety for excavation work (first revision), 1992
8. Indian Standard 4014(Part 2), Code of practice for steel tubular scaffolding: Part 2 Safety regulations for scaffolding, 1967.
9. Indian Standard 4081, Safety code for blasting and related drilling operations (First Revision), 1986
10. Indian Standard 4130, Safety code for demolition of buildings (second revision), 1991
11. Indian Standard 4138, Safety code for working in compressed air (first revision), 1977
12. Indian Standard 4756, Safety code for tunnelling work (first revision), 1978
13. Indian Standard 4912, Safety requirements for floor and wall openings, railings and toe boards (first revision), 1978
14. Indian Standard 5121, Safety code for piling and other deep foundations, 1969
15. Indian Standard 5916, Safety code for construction involving use of hot bituminous materials, 1970
16. Indian Standard 7293, Safety code for working with construction machinery, 1974
17. Indian Standard 7969, Safety code for handling and storage of building materials, 1975

18. Indian Standard 8989, Safety code for erection of concrete framed structures, 1978
19. Indian Standard 10067, Material constants in building works, 1982
20. Indian Standard 10291, Safety code for dress divers in civil engineering works, 1982
21. Indian Standard 13415, Code of safety for protective barriers in and around, 1992
22. Indian Standard 13416(Part 1), Recommendations for preventive measures against hazards at workplaces: Part 1 Falling material hazards prevention, 1992
23. Indian Standard 13416(Part 2), Recommendations for preventive measures against hazards at workplaces: Part 2 Fall prevention, 1992
24. Indian Standard 13416(Part 3), Recommendations for preventive measures against hazards at workplaces: Part 3 Disposal of debris, 1994
25. Indian Standard 13416(Part 4), Recommendations for preventive measures against hazards at workplaces: Part 4 Timber structure, 1994
26. Indian Standard 13416(Part 5), Recommendations for preventive measures against hazards at workplaces: Part 5 Fire protection, 1994
27. Indian Standard 13430, Code of practice for safety during additional construction and alteration to existing buildings, 1992

SITE INSTRUCTION
SECTION-3B(a)
(Industrial safety clauses)

With a view to bring uniformity in various Industrial Safety requirements to be fulfilled under works contracts, as brought out in Schedule-A of General Conditions of Contract and also to strengthen the Industrial Safety at KKNPP Site and township in general, following Industrial Safety clauses are to be incorporated in Section-III (Special Instructions) of the tender document for all future Works/Service contracts.

Applicability:

PART-A of the Site Instruction shall be applicable for all Works/Service contracts issued by KKNPP Unit-1&2.

PART-B of the Site Instruction shall be applicable for all Works/Service contracts issued by KKNPP Unit-3&4 and KKNPP Unit-5&6.

Definitions:

- a. **Height work:** Any work with a fall potential of 2.5 meter or more from the floor level of working elevation.
- b. **Height Pass:** It is a document which qualifies a person to work at heights; but it is not a permit to work on a specific job at height i.e. it is not an "Industrial Safety Permit" Hence a person has to take Industrial Safety Permit for all jobs at height separately. Height passes in prescribed format shall be issued to contractors' employees.
- c. **Job Hazard Analysis (JHA):** It is a process in which a hazardous activity is broken down in to sequential steps and each step is critically analyzed to identify the hazards involved; thereby identifying and developing remedial measures to overcome these hazards and implement those measures to carry out the job safely.
- d. **Confined space:** Any space by reason of its construction as well as in relation to the nature of the work carried therein and where hazards to the persons entering into or working inside exist or likely to develop during working. (Rule 88 (Sch-II) of AE (F) R-1996).
- e. **Safety Officer:** Person with qualification specified in Rule 43, sub rule 5 of AE (F) R 1996.
- f. **Safety Supervisor :** Person with Diploma in Engineering; and Diploma in Industrial Safety recognized by the Central/State Government or 6 years of supervisory experience

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- g. **Safety Coordinator** : Person with Diploma in Engineering; and Diploma in Industrial Safety recognized by the Central/State Government or 6 years of supervisory experience

[I] PART-A: Clauses applicable for all Works/Service contracts issued by KKNPP Unit-1&2.

1.0 Safety Plan/Policy

All contractors working at KKNPP-1&2 shall adhere to the Integrated Management System Policy of KKNPP on Quality, Environmental and Occupational Health & Safety.

2.0 Deployment of Safety Professional

- 2.1 Minimum one Safety Officer with qualification specified in Rule 43, Sub rule 5 of AE (F) R 1996 shall be deployed in works/services contract which demands/involves the Dangerous Manufacturing Process or Operations as specified in the Rule 88 of AE (F) R 1996. Details are given in Section 7.0.

- 2.2 In the works/services contract which does not demand/involve the Dangerous Manufacturing Process or Operations as specified in the Rule 88 of AE (F) R 1996, a Safety Coordinator shall be deployed specifically to ensure the safety requirement in the works/services contract, maintain all safety related records and to fulfill the safety requirements during job execution.

3.0 Safety organization of the Contractor:

- 3.1 The number of Safety Professionals (Safety Officer/ Safety Coordinator) to be deployed in the work order shall be decided by concerned Engineer in Charge in consultation with Head (I&FS), concerned Section Head and based on the nature of job and number personnel to be deployed in the work order. The number of Safety Professionals required shall be specified in the Sr. No.13 of Schedule 'A'
- 3.2 With reference to Clause No. 5.6.14 and Sr. No.13 of Schedule-A of General Conditions of Contract in respect to deployment of Safety

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Professionals (Safety Officer/ Safety Coordinator), the following requirement shall be taken as generic guideline:

Sl. No.	Manpower	No. of Safety Officers to be appointed	No. of Safety Coordinator to be appointed
1	1 to 25	-	1
2	26 - 100	-	2
3	101 - 250	1	3
4	251 - 500	1	4
5	Above 500	1 for every addl. 500 workers in addition to number mentioned against Sr. No. 4	1 for every addl. 200 workers in addition to number mentioned against Sr. No. 4

Note:

- a. Minimum one Safety Officer with qualification specified in Rule 43, sub rule 5 of AE (F) R 1996 shall be deployed in works/services contract demands/involves the Dangerous Manufacturing Process or Operations as specified in the Rule 88 of AE(F)R 1996. Details are given in Section 7.0.
- b. All Contractors' safety professionals must be well aware about Acts, Rules, concerned with Industrial Safety and practices particularly applicable to the plant and to that effect they have to undergo an assessment at the plant during their placement at the plant. Details are given in Section 6.0.

4.0 Qualification of Safety Professionals:

4.1 (Ref : Rule 43, sub rule 5 of AE(F)R 1996)

4.1.1 Safety Officer

- (a) A person shall not be eligible for appointment as a Safety Officer unless he

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(i) possesses-(1) a recognised degree or equivalent in any branch of engineering or technology and has had practical experience of working in a factory in a supervisory capacity for a period of not less than 2 years; or (2) a recognised degree in physics or chemistry and has had practical experience of working in a factory in a supervisory capacity for a period of not less than 5 years; or (3) a recognised diploma or equivalent in any branch of engineering or technology and has had practical experience of working in a factory in a supervisory capacity for a period of not less than 5 years;

(ii) possesses a degree or diploma in industrial safety recognised by the Central / State Government in this behalf; and

(iii) has adequate knowledge of the language spoken by majority of the workers in the region in which the factory where he is to be appointed is situated.

(b) Notwithstanding the provisions contained in clause (a), any person who -

(i) possesses a recognised degree or diploma in engineering or technology and has had experience of not less than five(5) years in a department of the Central or State Government which deals with the administration of the Factories Act, 1948 or the Dock Workers(Safety, Health and Welfare) Act, 1986 (54 of 1986) or

(ii) possesses a recognised degree or diploma in engineering or technology and has had experience of not less than 5 years, full time, on training, education, consultancy, or research in the field of accident prevention in industry or in any institution; shall also be eligible for appointment as a Safety Officer:

4.1.2 Safety Coordinator

a. Diploma in Engineering; and

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- b. Diploma in Industrial Safety recognized by the Central/ State Government or 6 years supervisory experience in the same/similar nature of work as in the work order.

5.0 Documents to submitted/maintained by the Safety Professional (Safety Officer/ Safety Coordinator)

- 5.1 Monthly report shall be submitted by any one the Safety Professionals in the work order to Head (I&FS) through respective Engineer in Charge before 5th of the following month.
- 5.2 The monthly report shall be submitted as per the attached format Annexure A.
- 5.3 The following registers shall be maintained and submitted by the Safety Professionals in the concerned Work Orders.
 - a. Training
 - b. Height Pass
 - c. Personnel Protective Equipment Inspection.
 - d. Portable Power Tools Inspection.
 - e. Material Handling Equipment, Lifting Tools & Tackles Inspection.
 - f. Injury/Incidents discussion.
 - g. Pep Talk.
 - h. Hand Tools Inspection.
 - i. Personnel Protective Equipment Issue.
 - j. Safety Observation
 - k. Contractor Safety Meeting Records

6.0 Assessment Requirement for Safety Professionals (Safety Officer/ Safety Coordinator) before deployment in Operating Stations

The Safety Officer/Safety Coordinator identified by the contractor, meeting above qualification shall be accepted for appointment based on assessment carried out by a committee consisting of Engineer in-charge of the work, representative of IS&F group and the Site in-charge of the concerned contractor or his representative.

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7.0 Dangerous Manufacturing Process or Operations as per the Rule 88 of AE(F)R 1996

- I. Electrolytic plating or oxidation of metal articles by use of an electrolyte containing acids, bases or salts of metals such as chromium, nickel, cadmium, zinc, copper, silver, gold, etc.
- II. Chemicals & Chemical works.
- III. Manipulation of stone or any other materials containing free silica
- IV. Grinding or glazing of metals
- V. Handling or manipulation of corrosive substances.
- VI. Foundry.
- VII. Electrical work.
- VIII. Beryllium operations
- IX. Zirconium operations.
- X. Cleaning or smoothing of articles by a jet of sand, metal shot or grit or other abrasive propelled by a blast of compressed air or steam.
- XI. Operations involving high noise level.
- XII. Highly flammable liquids & flammable compressed gases.
- XIII. Radioactive substances.
- XIV. Laser & Optical Radiations.
- XV. Motor Vehicle Garages.
- XVI. Cryogenic Liquids.
- XVII. Alkali Metals.

8.0 Requirements and specification of PPEs

- 8.1 Contractors must maintain adequate stock of Personal Protective Equipment (PPE) and safety gears such as safety nets, fall arrestor systems, safety barricades, signage etc. conforming to relevant Indian Standards (or relevant international standards), required to be used during execution of the work.
- 8.2 These PPE's, tools and appliances must be inspected monthly by Safety officer / Safety Coordinator of Contractor and records of such inspection

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shall be submitted to Head (I&FS), KKNPP 1&2 through respective Engineer in charge along with monthly safety report.

9.0 Work Practices (Ref: AERB Notification dated Nov 29, 2004. Annexure-C)

9.1 General

- 9.1.1 Prior to taking up the day's work, Pre Job Briefing/Pep talks will be carried out by Contractors' Site Engineer, Safety officer, Safety Coordinator or Site in charge involving all the workers.
- 9.1.2 The Contractor shall make arrangements for adequate and qualified supervision during the execution of jobs.
- 9.1.3 The Contractor shall ensure that safety work permits are taken for each high-risk job as per project procedures.
- 9.1.4 Job Hazard Analysis (JHA) shall be carried out for all high risk jobs or as advised by NPCIL Engineer-in-charge or Safety Officer.

9.2 Work at height

- 9.2.1 For carrying out works at height, height pass should be provided for all the workers involved in the work as per procedure, which includes ascertaining medical fitness by Registered Medical Practitioner and worker's physical test etc. If any worker is found working at height without required height pass, penalty Annexure - A shall be imposed.
- 9.2.2 Height work permit shall be obtained for all the works carried out on temporary staging, platforms etc. with a fall potential of 2.5 meter or more from the floor level of working elevation. All implements used for height work such as scaffold, access stairs/ladders, platform, railings etc should be certified by concerned Engineer prior to its use and to the effect that they should have a display card as "Safe for use". Wood, bamboo or other combustible materials shall not be used for making staging/scaffolds. The minimum 1m width of working platforms shall be maintained. All scaffolds or staging shall have guard rails, mid rails and toe boards. Safe means of access by means of portable or fixed ladders, stairways or ramps shall be provided for all workplaces at height. Cross bracings or frames of scaffold shall not be permitted as means of access.

Safety nets, fall arrestor system, lifelines and other such additional safety measures commensurate with the location and nature of work

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shall also be provided. Full body safety harness with double lanyard shall only be allowed for work at height.

9.3 **Electrical Safety**

- 9.3.1 All electric supply lines and electrical apparatus used at site shall be of sufficient ratings for power, insulation and estimated fault current and of sufficient mechanical strength, for the duty ~~which~~ they may be required to perform under the environmental conditions of installation, and shall be constructed, installed, protected, worked and maintained in such a manner as to ensure safety of human beings, animals and property. All such material and apparatus shall conform to requirements under relevant codes of Bureau of Indian Standards.
- 9.3.2 Earth pits in accordance with Rule 61 of Indian Electricity Rules, 1956 and as specified in IS 3043:1987, shall be provided and maintained at Contractor's work premises. Healthiness of earthing shall be checked physically at least once in a month and earth pit resistance shall be measured at least once in 6 months.
- 9.3.3 All power distribution boards, electrically operated equipment/tools, cables, power extension boards etc. shall be inspected every month for ensuring their healthiness. Inspection stickers shall be affixed on all such equipment/tools.
- 9.3.4 Metal clad power sockets and plugs shall be used at worksites for extension of power to equipment. MCBs shall be used as ~~isolation switch~~ as well as overload protection device. Flexible cables used for extension of power shall be double sheathed three core type. Twisted insulated wires shall not be used for this purpose. The cables used shall be free of joints as far as practically possible. Where joints are essential, the same shall be made as per standard industrial practices. Joints made with insulating tapes shall not be allowed at workplaces.
- 9.3.5 Earth leakage protection shall be provided to all electrical equipment/tools/appliances using ELCB/RCCB (sensitivity 30mA). ELCB/RCCBs shall be inspected every month for their healthiness. Apart from the power distribution boards, all extension boards shall also be provided with ELCB/RCCBs. The specifications for power distribution boards and extension boards shall be in accordance with the requirements of NPCIL.

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- 9.3.6 If use of electrical energy is required for execution of the work, the Contractor shall ensure the healthiness of electrical power supply and portable power tools by licensed electrician.
- 9.3.7 At least one portable fire extinguisher (DCP or CO₂) shall be provided near each power distribution board.
- 9.3.8 Rubber mats conforming to IS: 15652 shall be used in front of all Power distribution boards.
- 9.3.9 Rubber hand gloves conforming to IS:4770 and Safety shoes shall be used by personnel working on electrical systems

9.4 **Material Handling**

- 9.4.1 All machinery, tools and tackles used for material handling such as cranes, chain pulleys, slings, shackles etc. shall be inspected at least once in 12 months by a Competent Person and records of such inspection shall be maintained. All machinery, tools and tackles used for material handling shall be conspicuously marked with safe working load, date of inspection/test and next due date for inspection/test.
- 9.4.2 All tools and tackles used for material handling shall be inspected once in a month at site prior to use and damaged/faulty/worn out equipment/tackles shall be immediately removed from the worksite.
- 9.4.3 Operation of cranes, fork lift trucks, winches etc. shall be carried out only by operators authorized for the purpose. Trained, experienced and authorized signalmen shall be deputed to give signals to the operators of material handling equipment. Except the designated signalman, no one should be allowed to give signals during material handling operations.
- 9.4.4 All cranes, fork lift trucks, winches etc. shall be thoroughly inspected once in a month at site by the Contractor.

9.5 **Welding, Gas cutting and other hot works**

- 9.5.1 Welding machines, gas cutting sets, blow torches, gas cylinders and accessories etc. as well as the connections shall be inspected for their healthiness prior to use.
- 9.5.2 The return cable of arc welding machine shall be connected to the job. Connecting the return cable to nearest earthed structure shall not be permitted for this purpose. Standard connectors shall be used for connecting welding cables to the welding machine. The current regulator shall also be connected using standard connectors. Use of unsafe means to connect welding cables or regulator shall be avoided.

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- 9.5.3 Welding cables shall be free from joints. In unavoidable cases, the joints shall be adequately insulated both thermally and electrically.
- 9.5.4 Flashback arrestors shall be provided at torch end as well as cylinder end in gas cutting sets.
- 9.5.5 Suitable trolleys shall be used to securely keep and shift the oxygen and DA/LPG cylinders.
- 9.5.6 Industrial LPG cylinders shall only be used for hot work. Domestic or commercial LPG cylinders shall not be used for ~~this~~ purpose.
- 9.5.7 At least one fire extinguisher shall be provided at each location of hot work.
- 9.5.8 All the gas cylinders shall be painted as per standard colour coding. Valve caps shall be provided on cylinder, when not in use.
- 9.5.9 Gas cylinders shall not be dropped or rolled.
- 9.5.10 During carrying out hot works, suitable fire preventive measures like, removal of combustible material from the work area, use of fire resistant blankets etc. shall be strictly followed.

9.6 **Safe storage of material**

- 9.6.1 Contractors shall ensure suitable and adequate place for storage of their material as well as material issued by NPCIL. The storage shall be done as per the standard storage requirements based on physical and chemical properties of the material.
- 9.6.2 Steel structural material, reinforcement rods etc. shall be properly stacked with adequate spacers. The height of the stacked material shall be restricted so as to maintain stability of the pile.
- 9.6.3 Gas cylinders shall not be stored in open places exposed to sunlight & rain. Storage of gas cylinders shall be done in designated sheds/rooms. Empty and filled cylinders shall be stored separately. Flammable gas cylinders shall not be stored along with oxygen cylinders. Valve caps shall be provided on the cylinders and adequate chaining arrangement shall be provided for protecting the cylinders against falling.
- 9.6.4 Flammable liquids shall be stored in pre-designated areas having adequate ventilation and fire fighting arrangements.
- 9.6.5 Corrosive chemicals shall be stored in accordance with the instructions given in Material Safety Data Sheet (MSDS). First aid measures for neutralizing the effects of the chemical shall be made available near the storage area.

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- 9.6.6 Smoking of beedi/cigarettes shall be strictly prohibited and sources of ignition shall be strictly controlled in storage areas.

9.7 Fire protection and Fire fighting arrangements

- 9.7.1 In accordance with the nature of material used during the execution of the job, suitable fire protection and fire fighting arrangements, shall be ensured by the Contractor.
- 9.7.2 Based on the fire load, sufficient numbers of portable fire extinguishers shall be made available at worksites.
- 9.7.3 All unwanted combustibles shall be removed from the worksites on daily basis.

9.8 Transportation of man and material

- 9.8.1 Contractor shall ensure safe movement of man and material as well as vehicles within site premises as per applicable rules/regulations. Non-roadworthy vehicles shall not be allowed at worksites.
- 9.8.2 Vehicles used for transportation of material shall not be used to transport workers.
- 9.8.3 Overloading/unsafe loading on vehicles shall be strictly prohibited.
- 9.8.4 Protective helmets (IS 4151:1993) shall be used by all two wheeler drivers.
- 9.8.5 Vehicles shall have a valid registration, fitness and PUC certificates. Drivers shall have valid driving license.
- 9.8.6 Vehicles shall be inspected for healthiness once in a month.
- 9.8.7 Material transported on flat bed trailers shall be properly lashed to prevent fall of material.
- 9.8.8 Transportation of ODC/OWC material shall be done only with prior permission from NPCIL. Adequate warning flags/lights and escorts shall be provided during such movements.
- 9.8.9 Reversing horns shall be provided in all vehicles.

9.9 Housekeeping

Requirements stated on housekeeping under General Conditions of Contract (GCC) shall be followed.

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The safety requirements to be followed at worksites are not limited to those mentioned above. All statutory safety requirements mandated under various applicable Acts and Rules enacted by the Government of India shall invariably be followed at KKNPP. Violation of statutory requirements shall attract punitive/penal actions. In addition, the safety violations during the execution of the present contract will be used as one of the factors for the performance evaluation of the Contractor, which in turn will be used for evaluation of future contracts.

Similarly, the requirements brought out in AERB Safety Guidelines 'Control of Works', which is a part of the contract documents, shall also invariably be followed.

Violation of such statutory and regulatory requirements shall attract a penalty.

Detailed procedures, guidelines, manuals etc. on various aspects of industrial safety periodically issued by NPCIL as a part of the continual improvement process, shall also be followed by the Contractors.

All concerned Section Heads/Engineers-in-charge of the works contract shall be responsible for implementation of these instructions during all stages of execution of the work.

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10.0 PENALTY STRUCTURE FOR NON-COMPLIANCE OF SAFETY REQUIREMENTS

Penalty for Works/Services contracts outside GeM shall be recovered as per the Circular No.NPCIL/EDCMM/Works/2023/M/195; dated 21.08.2023 “Standard Special Conditions of Contracts for Works/Services contracts outside GeM”.

Penalty for Works/Services contracts through GeM shall be recovered as per the Circular No. NPCIL/Works/ACE-CTC/2023/M2; dated 13.01.2023 “System Improvement in Penalty Clauses and requirement of Supervisor(s) in various Services, Service Cum Maintenance contracts.

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Annexure A**Format of Monthly Report to be submitted by Contract Safety Professional**

Name of the Contractor : M/s. _____
Work Order No:
Description of the Work Order:

MONTHLY SAFETY STATUS REPORT**For the Month & Year :**

Sr. No.	Description	During the Month -----	During the Year --- -----
1	Average number of employees		
2	Man hours worked		
3	No. of fatal accidents		
4	No. of dangerous occurrences		
5	No. of accidents of serious nature		
6	No. of reportable injuries		
7	No. of non-reportable accidents		
8	No. of First aid injuries		
9	No. of near-miss accidents		
10	No. of fire incidents reported		
11	No. of man days lost		
12	Frequency rate		
13	Severity rate		
14	No of Personnel Trained	During the Month -----	During the Year --- -----
	14.1 Induction training (1/2 day)		
	14.2 Referesher training(1/2 day)		
	14.3 Pep talk		
	14.4 Seminar		
	14.5 First Aid training		
	14.6 Others (Specify)		

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	Work Permits		During the Month -----	During the Year --- -----
15	15.1	Excavation		
	15.2	Confined Space		
	15.3	Cutting & welding		
	15.4	Height work permits		
	15.5	Electrical permits		
	15.6	Hot line / hot environment permit		
	15.7	No. of Height passes issued		
	15.8	No. of Height passes revalidated		
	15.9	No. of SRDs received		
	15.10	No. of pending SRDs		
	15.11	Any other (Specify)		
16	Testing of Material Handling Equipment		During the Month -----	During the Year --- -----
	16.1	No. of cranes available & tested		
	16.2	No. of chain pulley available & blocks tested		
	16.3	No. of slings and shackles available & tested		
	16.4	Others MH equipment available & tested (specify)		

	Industrial & Fire Safety Surveillance & Enforcement Measures		During the Month -----	During the Year -----
17	17.1	No. of housekeeping inspections		
	17.2	No. of Fire Safety inspection carried out		
	17.3	No. of Safety meetings conducted		
	17.4	No. of Safety poster displayed		
	17.5	No. of Safety film shows conducted		
	17.6	No. of new Safety poster displayed		
	17.7	No. of plants safety surveys conducted		
	17.8	No. of illumination surveys conducted		
	17.9	No. of noise surveys conducted		
	17.10	No. of working platform / scaffoldings inspected & tagged		

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	17.11	No. of portable fire extinguishers inspected		
	17.12	No. of safety competitions conducted		
	17.13	No. of personnel found working without proper PPEs		
	17.14	No. of first aid kits inspected		
	17.15	Total No. of personnel with electrical license from state government		
	17.16	No. of personnel authorized/re-authorized for electrical works during the reported period		
	17.17	No. of crane and fork lift operators available with age less than 45 years		
	17.18	No. of crane and fork lift operators available with age less than 45 years, medically examined (Once in a year)		
	17.19	No. of crane and fork lift operators available with age more than 45 years		
	17.20	No. of crane and fork lift operators available with age more than 45 years, medically examined (Once in 6 months)		
	17.21	No. of crane and fork lift signal men available with age less than 45 years		
	17.22	No. of crane and fork lift signal men available with age less than 45 years, medically examined (Once in a year)		
	17.23	No. of crane and fork lift signal men available with age more than 45 years		
	17.24	No. of crane and fork lift signal men available with age more than 45 years, medically examined (Once in 6 months)		
	17.25	No. of riggers available with age less than 45 years		
	17.26	No. of riggers available with age less than 45 years, medically examined (Once in a year)		
	17.27	No. of riggers available with age more than 45 years		
	17.28	No. of riggers available with age more than 45 years, medically examined (Once in 6 months)		
18	Inspection of PPEs		During the Month -----	During the Year -----
	No. of Safety belts available & inspected			
	No. of Safety belts discarded			
	No. of helmets available & inspected			
	No. of helmets discarded			
	No. of other PPEs available & inspected (Specify)			
	No. of other PPEs discarded (Specify)			
19	Inspection of Portable Power Tools		During the	During the

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	Month -----	Year -----
Total no. of power tools available		
No. of power tools inspections conducted (Specify)		
Total no. of extension boxes available		
Total no. of extension boxes inspected		
No. of ELCBs tested		
20 Other information (if any)		

Analysis of Reportable Injuries (RI) / Non Reportable Injuries (NRI) / First Aid Injuries (FAI) / Near Miss Accidents (NMA)

Injury/Incident Type (FA/ASN/RI/NRI/FAI/NMA) : -----					
Total No. of NMAs :					
Sl. No.	Agency	Type	Potential Body Part	Injury/Incident	Date of Submission
Brief description Injury/Incident					
(*) as described in IS : 3786					

Note: Supporting documents pertaining to the data submitted are subjected to scrutiny during Safety / IMS audits.

Prepared By :

Approved By :

Name & Signature of
Safety Officer/Safety Coordinator

Name & Signature of
Contractor/Site In Charge

Thru : Engineer in Charge

Submitted to Head (I&FS), KKNPP 1&2

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[II] PART-B: Clauses applicable for all Works/Service contracts issued by KKNPP Unit-3&4 and KKNPP Unit-5&6

1.0 Project Safety Plan

A project specific Health and Safety plan shall be developed by the Contractor and submitted for approval from NPCIL, prior to commencement of the work.

2.0 Safety organization of the Contractor:

With reference to Clause No. 5.6.14 and Sr. No.13 of Schedule-A of General Conditions of Contract in respect to deployment of Safety Professionals, the following minimum requirement shall be fulfilled:

Sr. No.	Manpower per Shift	No. of Safety Officers to be appointed	No. of Safety Supervisors to be appointed
1	Up to 20	Nil	01
2	21 to 100	Nil	02
3	101 to 200	Nil	03
4	201 to 350	Nil	04
5	351 to 500	01	05
6	Above 500	1 for every addl. 500 workers in addition to number mentioned against Sr. No. 5	1 for every addl. 200 workers in addition to number mentioned against Sr. No. 5

3.0 Qualification of Safety Professionals:

(Ref: AERB Notification dated July 8, 2002; Annexure-B)

- **Safety Officer** : Degree in Engineering and Diploma in Industrial Safety, recognized by the Central / State Government
- **Safety Supervisor:** Diploma in Engineering and Diploma in Industrial Safety recognized by the Central/ State Government or 6 years supervisory experience.

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The methodology of acceptance of Safety Professional shall be as follows:

The Safety Officer/Safety supervisor identified by the contractor, meeting the above qualification shall be accepted for appointment based on assessment carried out by an adhoc committee consisting of Engineer in-charge of the work, representative of IS&F group and the Site in-charge of the concerned contractor or his representative.

4.0 Training requirements

- 4.1 Safety Training for contract persons, as referred in Clause No.5.6.4 and Sr.No.12 of Schedule - A of General conditions of Contract, shall be provided by the Contractor.
- 4.2 For the works where deployment of safety supervisor is not applicable, industrial safety training shall be provided by NPCIL.
- 4.3 For all works having manpower less than or equal to 100 persons, the safety training shall be carried out at NPCIL's safety training centre.
- 4.4 For all works having manpower more than 100, the Contractors shall establish their own safety training centre having adequate seating capacity and infrastructure for training.
- 4.5 After the induction safety training, the workmen should undergo refresher training once in every six months. Safety training card in prescribed format shall be issued to all workmen after completion of training.
- 4.6 The duration of the training shall be minimum four hours. The typical syllabus for the training is as follows :
 - Hazards at construction sites. Use of personal protective equipment and their practical demonstration. Mock drill to ensure proper use of PPEs. Need for preventing accidents.
 - Aims and Objectives of safety, pep talk, and housekeeping. Safety Work Permit and Authorization to work on system equipment. Height Pass training and briefing about hazard prompt list.
 - DOs and DON'Ts on construction activities. Briefing about location of First aid/Fire station/Safety Section and their telephone numbers. Good safety practices of NPCIL projects.
 - Films on construction safety and feedback.
 - Action in case of radiological emergency.

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- 4.7 The safety supervisors and the safety engineers will have to undergo refresher safety training in safety supervision and accident prevention techniques conducted by National Safety Council or other recognized institutions once in a year.

5.0 Requirements and specification of PPEs

- 5.1 Contractors must maintain adequate ~~stock~~ of Personal Protective Equipment (PPE) and safety gears such as safety nets, fall arrestor systems, safety barricades, signage etc. conforming to relevant Indian Standards (or relevant international standards), required to be used during execution of the work. Guidelines applicable at site on use of Safety Helmet, reflective jacket and safety shoes shall be followed.
- 5.2 These PPE's, tools and appliances must be inspected monthly by Safety officer / Safety supervisor of Contractor and records of such inspection shall be submitted to Head (I&FS) of concerned unit through respective Engineer in charge along with monthly safety report.

6.0 Work Practices

(Ref : AERB Notification dated Nov 29, 2004. Pls. see Annexure-C)

6.1 General

- 6.1.1 Prior to taking up the day's work, Pre Job Briefing/Pep talks will be carried out by Contractors' Site Engineer, Safety officer, Safety Supervisor or Site in charge involving all the workers.
- 6.1.2 The Contractor shall make arrangements for adequate and qualified supervision during the execution of jobs.
- 6.1.3 The Contractor shall ensure that safety work permits are taken for each hazardous jobs as per project procedures.
- 6.1.4 Job Hazard Analysis (JHA) shall be carried out for all hazardous jobs or as advised by NPCIL Engineer-in-charge or Safety Officer.

6.2 Work at height

- 6.2.1 For carrying out work at height of more than 2.5 meters above floor/ground level, height pass should be provided for all the workers involved in the work as per procedure, which includes ascertaining

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- medical fitness by Registered Medical Practitioner and worker's physical test etc.
- 6.2.2 Height work permit shall be obtained for all the works carried out on temporary staging, platforms etc. above a height of 2.5 meters from stable floor or ground floor. All implements used for height work such as scaffold, access stairs/ladders, platform, railings etc should be certified by concerned Engineer prior to its use and to the effect that they should have a display card as "Safe for use". Wood, bamboo or other combustible materials shall not be used for making staging/scaffolds.
- 6.2.3 Safety nets, fall arrestor system, lifelines and other such additional safety measures commensurate with the location and nature of work shall also be provided. Full body safety harness with double lanyard shall only be allowed for work at height.
- 6.3 Scaffolding Safety
- 6.3.1 Scaffolds with working platform shall be used for working at height, wherever necessary or as instructed by the Engineer in-charge of the work. All such scaffolds shall conform to IS:2750-1964, IS 3696 (Part-1)-1987 and IS 4014-1967 (Part 1 & 2).
- 6.3.2 Damaged or rusted material shall not be used for construction of scaffolds. Makeshift arrangements shall not be made as a substitute to standard scaffolding components like coupling pins, pigtail pins etc.
- 6.3.3 For ease of identification, all components of scaffolding used by different contractors shall be painted in different colours. The colour for scaffolding may be chosen in consultation with the Engineer in-charge of the work.
- 6.3.4 Metallic (steel or aluminium) modular scaffolds or steel tubular scaffolds shall be used along with metallic platform boards. Timber or bamboo scaffolds and timber platform boards are not allowed to be used at KKNPP.
- 6.3.5 Erection and dismantling of scaffolds shall be done by experienced workers under the supervision of an engineer/supervisor trained on scaffold erection and dismantling.
- 6.3.6 Metallic base plates with screw jacks shall be provided at the base of the scaffolds. If the scaffold is erected on soil, mudsills shall be laid on

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adequately compacted and leveled ground over which, base plates shall be fixed.

- 6.3.7 After completion of the first lift, the scaffolds shall be plumbed for verticality. Screw jacks on base plates shall be used for adjustment. Pieces of wood, metal or concrete blocks shall not be placed underneath the base plates for this purpose.
- 6.3.8 The following colour coding shall be followed for scaffolding tags:
- Red colour : Scaffold Unsafe ~~for use~~
 - Yellow colour : Scaffold under erection/dismantling
 - Green colour : Scaffold safe for use
- 6.3.9 The scaffolding shall not be used unless the Engineer in-charge of the work or his representative has certified it as safe for use.
- 6.3.10 Safe means of access through standard metallic ladders, stairways or ramps shall be provided to reach the working platform. The ladder shall be extended at least 1m above the platform boards. Parts of the scaffolding shall not be used as means of access.
- 6.3.11 The working platform shall be closely boarded, with its width not less than 1m. Working platforms shall be provided with guard rails, mid-rails and toe boards. The height of the guard rail shall not be less than 900 mm and not more than 1200 mm. The height of the toe boards shall not be less than 150mm. The guard rails, mid rails and toe boards shall be so placed as to prevent the fall of persons, materials and tools from the platform.
- 6.3.12 Safety nets shall be wrapped around the scaffolds to ~~prevent fall of men~~ and material.
- 6.3.13 If rolling scaffolds are used, locking arrangements shall be provided for all castor wheels. Moving of rolling scaffolds with workers on the platform shall be prohibited.
- 6.3.14 Scaffolds shall be erected keeping safe distance from un-insulated power lines (minimum distance of 3m, which shall be increased with the increase in the system voltage in consultation with concerned electrical engineer). All scaffolds shall be earthed by connecting them to well maintained earth pits.
- 6.3.15 Scaffolds shall be inspected once in every 15 days by an engineer designated for the purpose by the concerned contractor and records of such inspection shall be maintained.

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6.4 Excavation and rock blasting

- 6.4.1 All the relevant statutory requirements under the Explosives Act, 1884 and Explosives Rules, 2008 shall be fulfilled during carrying out rock blasting using explosives.
- 6.4.2 IS 3764 : 1992; 'Code of safety for excavation work' shall followed during carrying out excavation work.
- 6.4.3 IS 4081 : 1986; 'Safety code for blasting and related drilling operations', shall be followed during carrying out rock blasting activities
- 6.4.4 A detailed procedure with Job hazard analysis (JHA) shall be submitted by the contractor to the Engineer In-charge of the work, prior to commencement of excavation and rock blasting.
- 6.4.5 All the heavy earth moving machines, vehicles, equipment used during excavation shall be inspected for healthiness once in a month by a designated engineer and records of such inspections shall be maintained.
- 6.4.6 Operators of heavy earth moving machines and vehicles shall be authorized for the purpose.
- 6.4.7 Signalmen shall be deputed along with all heavy earth moving machines and vehicles to guide the operators during its movement and operation.
- 6.4.8 Minimum 20 lux of illumination level shall be maintained wherever excavation works are carried out during late evening or night hours.
- 6.4.9 The timing for carrying out rock blasting at site shall be decided in consultation with the engineer in-charge of the work.
- 6.4.10 Rigid barricades with self illuminated warning lights or painted with photo-luminescent paints shall be provided all around the excavated areas.
- 6.4.11 Reversing horns shall invariably be provided in all earth moving equipment and vehicles

6.5 Electrical Safety

- 6.5.1 All electric supply lines and electrical apparatus used at site shall be of sufficient ratings for power, insulation and estimated fault current and of sufficient mechanical strength, for the duty which they may be required to perform under the environmental conditions of installation. The sufficiency of the size, capacity and nature of various components of electrical network and apparatus installed by the contractors shall be accessed by the concerned electrical engineer of NPCIL with respect to the intended electrical load and other parameters, before release of

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- power supply. The electrical system and network shall be inspected once in a month by designated engineer of the contractor for ascertaining healthiness and records of such inspections shall be maintained. All the material and apparatus used in electrical system shall conform to relevant codes of Bureau of Indian Standards.
- 6.5.2 Earth pits in accordance with latest CEA Regulations and as specified in IS 3043:1987, shall be provided and maintained at Contractor's work premises. Healthiness of earthing shall be checked physically at least once in a month and earth pit resistance shall be measured at least once in 6 months. Earth pits shall be provided with identification numbers and earth pit resistance value and last date of measurement shall also be displayed.
- 6.5.3 All power distribution boards, electrically operated equipment/tools, cables, power extension boards etc. shall be inspected every month for ensuring their healthiness. Inspection stickers shall be affixed on all such equipment/tools.
- 6.5.4 Metal clad power sockets and plugs shall be used at worksites for extension of power to equipment. MCBs shall be used as isolation switch as well as overload protection device. Flexible cables used for extension of power shall be double sheathed three core type. Twisted insulated wires shall not be used for this purpose. The cables used shall be free of joints as far as practically possible. Where joints are essential, the same shall be made as per standard industrial practices. Joints made with insulating tapes shall not be allowed at workplaces.
- 6.5.5 Earth leakage protection shall be provided to all electrical equipment/tools/appliances using ELCB (sensitivity 30mA). ELCBs shall be inspected every month for their healthiness. Apart from the power distribution boards, all extension boards shall also be provided with ELCBs. The specifications for power distribution boards and extension boards shall be in accordance with the requirements of NPCIL.
- 6.5.6 If use of electrical energy is required for execution of the work, the Contractor shall deploy qualified and licensed electrician(s). Minimum qualification for such electrician shall be ITI in electrical trade. He should also possess electrician/wireman license issued by concerned state government authority.
- 6.5.7 At least one portable fire extinguisher (DCP or CO2) shall be provided near each power distribution board.

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- 6.5.8 Rubber mats conforming to IS:15652 shall be used in front of all Power distribution boards.
- 6.5.9 Rubber hand gloves conforming to IS:4770 and Safety shoes shall be used by personnel working on electrical systems.
- 6.5.10 Electrical power cables shall not be laid haphazardly on the ground/floor. They shall be safely routed overhead or through designated path as directed by the Engineer in-charge of the work.
- 6.5.11 A single line diagram showing the incoming supply and distribution scheme shall be provided on each power distribution board. The name and contact number of the person responsible for its maintenance shall also be provided on it.

6.6 Material Handling

- 6.6.1 All machinery, tools and tackles used for material handling such as cranes, chain pulleys, slings, shackles etc. shall be inspected at least once in 12 months by a Competent Person and records of such inspection shall be maintained. All machinery, tools and tackles used for material handling shall be conspicuously marked with identification number, safe working load, date of inspection/test and next due date for inspection/test.
- 6.6.2 All equipment, tools and tackles used for material handling shall be inspected once every month at site by designated engineer of the contractor prior to use and damaged/faulty/worn out equipment/tackles shall be immediately removed from the worksite.
- 6.6.3 Operation of cranes, fork lift trucks, winches etc. shall be carried out only by operators authorized for the purpose. Trained, experienced and authorized signalmen shall be deputed to give signals to the operators of material handling equipment. Except the designated signalman, no one should be allowed to give signals during material handling operations.
- 6.6.4 All cranes shall have Automatic safe load indicators (ASLI) and the same shall be maintained in healthy condition.
- 6.6.5 Tandem operation of cranes shall only be carried out with prior approval of the Engineer in-charge.
- 6.6.6 Erection, dismantling or alteration of height of tower cranes shall be carried out with approved procedure and Job hazard analysis.
- 6.6.7 When two or more tower cranes have to be erected with overlapping radius of operation, suitable engineering and administrative control

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measures shall be adopted to avoid collision of jibs/loads, in consultation with the Engineer in-charge of the work.

- 6.6.8 The weight of the material to be lifted shall be made known clearly to the rigging crew and crane operator by the concerned engineer before commencing the operation.
- 6.6.9 If multiple items (like reinforcement rods) are being lifted, the rigging crew shall be provided with a written statement of the weight of individual items based on its dimensions and maximum numbers that can be lifted at one instance.
- 6.6.10 Every crane operator or lifting appliance operator should be authorised. No person under the age of 18 years should be in charge of any hoisting machine or give signal to an operator of such machine

6.7 Welding, Gas cutting and other hot works

- 6.7.1 Welding machines, gas cutting sets, blow torches, gas cylinders and accessories etc. as well as the connections shall be inspected for their healthiness prior to use.
- 6.7.2 The return cable of arc welding machine shall be connected to the job. Connecting the return cable to nearest earthed structure shall not be permitted for this purpose.
- 6.7.3 Standard connectors shall be used for connecting welding cables to the welding machine. The current regulator shall also be connected using standard connectors. Use of unsafe means to connect welding cables or regulator shall be avoided.
- 6.7.4 Welding cables shall be free from joints. In unavoidable cases, the joints shall be adequately insulated both thermally and electrically.
- 6.7.5 Flashback arrestors shall be provided at torch end as well as cylinder end in gas cutting sets.
- 6.7.6 Suitable trolleys shall be used to securely keep and shift the oxygen and DA/LPG cylinders.
- 6.7.7 Industrial LPG cylinders shall only be used for hot work. Domestic or commercial LPG cylinders shall not be used for this purpose.
- 6.7.8 At least one fire extinguisher shall be provided at each location of hot work.
- 6.7.9 All the gas cylinders shall be painted as per standard colour coding. Valve caps shall be provided on cylinder, when not in use.
- 6.7.10 Gas cylinders shall not be dropped or rolled.

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6.7.11 During carrying out hot works, suitable fire preventive measures like, removal of combustible material from the work area, use of fire resistant blankets etc. shall be strictly followed.

6.8 Safe storage of material

6.8.1 Contractors shall ensure suitable and adequate place for storage of their material as well as material issued by NPCIL. The storage shall be done as per the standard storage requirements based on physical and chemical properties of the material.

6.8.2 Steel structural material, reinforcement rods etc. shall be properly stacked with adequate spacers. The height of the stacked material shall be restricted so as to maintain stability of the pile.

6.8.3 Gas cylinders shall not be stored in open places exposed to sunlight & rain. Storage of gas cylinders shall be done in designated sheds/rooms. Empty and filled cylinders shall be stored separately. Flammable gas cylinders shall not be stored along with oxygen cylinders. Valve caps shall be provided on the cylinders and adequate chaining arrangement shall be provided for protecting the cylinders against falling.

6.8.4 Flammable liquids shall be stored in pre-designated areas having adequate ventilation and fire fighting arrangements.

6.8.5 Corrosive chemicals shall be stored in accordance with the instructions given in Material Safety Data Sheet (MSDS). First aid measures for neutralizing the effects of the chemical shall be made available near the storage area.

6.8.6 Smoking of beedi / cigarettes shall be strictly prohibited and sources of ignition shall be strictly controlled in storage areas.

6.9 Fire protection and Fire fighting arrangements

6.9.1 In accordance with the nature of material used during the execution of the job, suitable fire protection and fire fighting arrangements, shall be ensured by the Contractor. Temporary fire water system with storage tanks and fire water pumps shall be provided for works involving high fire hazard potential, if so directed by the Engineer In-charge of the work.

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- 6.9.2 Based on the fire load, sufficient numbers of portable fire extinguishers shall be made available at worksites. The number and type of fire extinguishers required to be provided can be
- 6.9.3 All unwanted combustibles shall be removed from the worksites on daily basis.
- 6.9.4 Workers shall be trained on fire fighting.
- 6.10 Transportation of man and material
- 6.10.1 Contractor shall ensure safe movement of man and material as well as vehicles within site premises as per applicable rules/regulations. Non-roadworthy vehicles shall not be allowed at worksites.
- 6.10.2 Vehicles used for transportation of material shall not be used to transport workers.
- 6.10.3 Overloading of vehicles shall be strictly prohibited.
- 6.10.4 Protective helmets (IS 4151:1993) shall be used by all two wheeler drivers.
- 6.10.5 Vehicles shall have a valid registration, fitness and PUC certificates. Drivers shall have valid driving license.
- 6.10.6 Vehicles shall be inspected for healthiness once in a month.
- 6.10.7 Material transported on flat bed trailers shall be properly lashed to prevent fall of material.
- 6.10.8 Transportation of ODC/OWC material shall be done only with prior permission from NPCIL. Adequate warning flags/lights and escorts shall be provided during such movements.
- 6.10.9 Reversing horns shall be provided in all vehicles.
- 6.11 Housekeeping
- Requirements stated on housekeeping under General Conditions of Contract (GCC) shall be followed.

The safety requirements to be followed at worksites are not limited to those mentioned above. All statutory safety requirements mandated under various applicable Acts and Rules enacted by the Government of India shall invariably be followed at KKNPP. Violation of statutory requirements shall attract punitive/penal actions. In addition, the safety violations during the execution of the present contract will be used as one of the factors for the

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performance evaluation of the Contractor, which in turn will be used for evaluation of future contracts.

Similarly, the requirements brought out in AERB Safety Guidelines 'Control of Works', which is a part of the contract documents, shall also invariably be followed.

Violation of such statutory and regulatory requirements shall attract a penalty.

Detailed procedures, guidelines, manuals etc. on various aspects of industrial safety periodically issued by NPCIL as a part of the continual improvement process, shall also be followed by the Contractors.

All concerned Section Heads/Engineers-in-charge of the works contract shall be responsible for implementation of these instructions during all stages of execution of the work.

Safety related deficiencies shall be discussed in sectional level safety committee of the concerned section and the safety related deficiencies on which penalty to be imposed will be decided by the committee.

Engineer in charge shall deduct the total penalty based on the SLSC decision from the monthly RA bill.

7.0 PENALTY STRUCTURE FOR NON-COMPLIANCE OF SAFETY REQUIREMENTS

Penalty for Works/Services contracts outside GeM shall be recovered as per the Circular No.NPCIL/EDCMM/Works/2023/M/195; dated 21.08.2023 "Standard Special Conditions of Contracts for Works/Services contracts outside GeM".

Penalty for Works/Services contracts through GeM shall be recovered as per the Circular No. NPCIL/Works/ACE-CTC/2023/M2; dated 13.01.2023 "System Improvement in Penalty Clauses and requirement of Supervisor(s) in various Services, Service Cum Maintenance contracts.

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Annexure B



प्रोफेसर सु. पां. सुखात्मे
अध्यक्ष
Prof. S. P. SUKHATME
CHAIRMAN

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परमाणु ऊर्जा नियामक परिषद
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भारत.
GOVERNMENT OF INDIA
ATOMIC ENERGY REGULATORY BOARD
6TH FLOOR, NIYAMAK BHAVAN,
ANUSHAKTI NAGAR, MUMBAI - 400 094.
INDIA.

July 8, 2002

NOTIFICATION

Subject: Industrial Safety Personnel at Construction Sites

Reference: (1) Section 40-B of the Factories Act, 1948

(2) Rule 43 of the Atomic Energy (Factories) Rules, 1996

The construction and erection activities in the Units of the Department of Atomic Energy under the purview of AERB have been reviewed in view of the large number of projects currently under execution. Considering the nature of the work, it is necessary to have a certain minimum number of Safety Officers and Safety Supervisors in each shift. The purpose of this notification is to specify the minimum number of personnel needed from the point of view of industrial safety.

Based on the provisions of the Factories Act, 1948 and the Atomic Energy (Factories) Rules, 1996, (References 1 and 2 above), it is hereby notified that all the construction and erection sites of the Department of Atomic Energy (under the purview of AERB) shall have a minimum number of officers and supervisors as below. These persons should be working exclusively for industrial safety.

Head, Industrial Safety: Qualifications: Degree in Engineering with Diploma in Industrial Safety

Number: 1

Safety Officers : Qualifications: Same as Head, Industrial Safety
Number: 1 in each shift (minimum).

If number of workers in a shift
(including contractors' workers) exceeds
1000, additionally 1 Safety Officer shall be
appointed for every 1000 workers.

Safety Supervisors: Qualifications: Diploma in Engineering and
Diploma in Industrial Safety or 6 years
experience.

Number: 2 in each shift (minimum).

If number of persons working in a shift
(including the contractors' workers) exceeds
1000, additionally 1 Safety Supervisor shall be
appointed for every 500 workers.

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परमाणु ऊर्जा नियामक परिषद
ATOMIC ENERGY REGULATORY BOARD

The placement of the required number of industrial safety personnel at all construction sites is to be ensured by the Project authorities before the start of excavation, construction and erection activities at the approved sites and augmented progressively as the activities increase. For on-going projects, the required number of industrial safety personnel should be in position within 3 months from the date of this notification and AERB shall be informed of the compliance of this notification.

The number of industrial safety personnel can be a mix of both Departmental and the major Contractor's personnel in the approximate ratio of 1:3. However, Head, Industrial Safety is a Departmental position. It must also be ensured that there is at least one departmental person in each shift.

Sukhas P. Sukhatme
(Competent Authority)

Heads of DAE Units

C.C. Vice Chairman, AERB
Heads of Divisions, AERB

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Annexure C



प्रोफेसर सु. पां. सुखात्मे
अध्यक्ष
Prof. S. P. SUKHATME
CHAIRMAN

भारत सरकार
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भारत.

GOVERNMENT OF INDIA
ATOMIC ENERGY REGULATORY BOARD
6TH FLOOR, NIYAMAK BHAVAN,
ANUSHAKTI NAGAR, MUMBAI - 400 094
INDIA.

AERB / IPSD / PKG / 2004 / 8274

November 29, 2004

NOTIFICATION

**Subject: Empowerment of Inspectors – Power To Stop Work
in case of unsafe conditions at the work spot**

Reference: Section 8 of the Factories Act, 1948

Rule 6 of the Atomic Energy (Factories) Rules, 1996

Rule 102 of the Atomic Energy (Factories) Rules, 1996

In view of the large number of projects currently under execution and large scale maintenance activity in operating plants, industrial safety aspects in the units of the Department of Atomic Energy under the purview of the Atomic Energy Regulatory Board were reviewed in a Discussion Meeting on July 15, 2004. Considering the nature of the work and accident potential, it was felt necessary that certain minimum industrial safety requirements must met by the Units. It was agreed that violation of these requirements could result in suspension of work. The purpose of this Notification is to specify the minimum industrial safety requirements and to empower AERB Inspectors to order suspension of work if these requirements are not in place in a plant/site.

Based on the provisions of the Factories Act, 1948 and the Atomic Energy (Factories) Rules, 1996 it is hereby notified that AERB Inspectors shall have power to stop work in case the industrial safety requirements as stipulated in the Annexure are not in place.

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परमाणु ऊर्जा नियामक परिषद
ATOMIC ENERGY REGULATORY BOARD

While exercising the above enforcement action in any of the DAE's operating plants or construction sites, the following modalities shall be followed:

1. The Inspector shall immediately communicate to Chairman/Vice Chairman, AERB about the prevailing situations orally and seek oral approval for cessation of activity/stoppage of work. A note ordering the same shall be given on the spot by the Inspector with his/her signature and a formal order by the Competent Authority will be issued subsequently.
2. The Occupier shall take the necessary corrective action and inform Chairman/Vice Chairman, AERB about the actions taken. The Inspector will again visit the work spot and give his/her recommendation for resumption of work after satisfying himself/herself that the industrial safety requirement is in place.
3. A written order for the resumption of the suspended work will be issued by the Chairman/Vice Chairman, AERB based on the report of the AERB inspector.

Suresh P. Subbatma
(Competent Authority)

**Unit Heads (Operating plants and Construction sites)
All AERB Inspectors under the Factories Act**

**Copy to: Vice Chairman, AERB
Chairman & Managing Director, NPCIL
Chairman & Managing Director, IREL
Chairman & Managing Director, UCIL
Chairman & Managing Director, ECIL
Chairman & Chief Executive, Heavy Water Board
Chairman & Chief Executive, Nuclear Fuel Complex
Chief Executive BRIT**

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ANNEXURE**Minimum safety precautions needed at any plant or site****1. Working at Height:**

- i) All open sides of a structure above a height of 3.5 metres from which a worker might fall and openings into which a worker might fall should be adequately covered or barricaded. Every opening in the floor of a building, or in a working platform shall be provided with suitable means to prevent fall of persons or materials by providing suitable fencing/railing of 1 m.
- ii) Where barricades can not be installed, a safety net should be installed close to the level at which there is a danger of a fall. During erection of tall buildings/structures, above 3.5 m height nylon nets shall be provided to ensure safety of men if there is a fall from height in case it is not possible to provide barricades.
- iii) Where a secure foothold is impracticable, safety belts or harnesses with secure anchorage points should be provided at the working place as well as access to the access path to the working spot. All persons working at heights more than 3.5 m above ground or floor and exposed to the hazard of falling down shall use safety belts.
- iv) At elevated places, secure access and foothold should be provided. Adequate and safe means of access and exit shall be provided at all work places for all elevations. Means of access may be portable or fixed ladder, ramp or a stairway. The use of cross braces or frame work as a means of access to the working surface shall not be permitted.
- v) Scaffolding or staging 3.5 m above the ground floor shall have a guard rail properly attached, bolted, braced or otherwise secured at least 1 m high above the floor and platform.
- vi) Where the platform is more than 3.5 m above ground floor for working standing on the platform, the width should be minimum 1 m.

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2. Excavation Works:

- i) Means for rapid access and egress should be provided. All trenches 120 cm or more in depth shall at all times be supplied with at least one ladder for every 30 m along the trench. The ladders shall extend from the bottom of the trench to at least 1 m above the surface of the ground.
- ii) Workers should not be exposed to the danger of being buried by excavated material or collapse of shoring. Measures to prevent dislodgment of loose or unstable earth, rock or other material from falling into the excavation by proper shoring shall be ensured.
- iii) Persons who are not engaged in excavation work shall be prevented from approaching excavation areas by placing warning signals, barricades, etc. near the site of the excavation.
- iv) Excavated material shall not be dumped within 1.5 m of the edges.
- v) An excavated area shall have an illumination level of at least 20 lux for night work.

3. Material Handling Operations:

- i) No lifting machine, chain, rope or lifting tackle shall be taken into use for the first time unless it has been tested and examined by a Competent Person. A certificate of such a test/examination specifying the safe working load and signed by the person making the test/examination should be available for inspection.
- ii) Cranes shall be operated only by authorised persons who are well trained and experienced.
- iii) Inspection and maintenance of material handling equipment should be frequently scheduled. Load testing of cranes at specified loads shall be carried out by the Competent Person at least once in twelve months.

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4. Portable Electrical Equipments

- i) All portable appliances which are powered by single phase AC supply shall be provided with three core cable and three pin plug or whole body should be double insulated.
- ii) All connections to portable equipment or machines from the panel/distribution board/extension board shall be taken using 3 core double insulated PVC flexible copper wire in one length.
- iii) Earth Leakage Circuit Breaker should be provided.

5. Fire Safety:

- i) Personnel trained in fire safety shall always be available on the site.
- ii) Flammable materials should be stored away from the source of ignition such as generators, welding sets and electrical distribution boxes.

6. Personal Protective Equipment:

It shall be ensured that commensurate with the nature of job appropriate PPEs with ISI marking are used by the workers.

7. Working in Confined Space:

No person should enter in any confined space like tanks, pit chamber etc. in which gas, fumes, vapours, dust is likely to be present to such extent that it may endanger his/her health without safety work permit.

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**QUALITY MANAGEMENT
SECTION-III C**

QUALITY MANAGEMENT REQUIREMENTS

1 Scope

This chapter specifies requirements to be incorporated in the Contractor's quality assurance programme for construction. The Contractor is responsible for planning and developing a programme that assures that all his management, design and technical responsibilities for quality and safety are incorporated and executed effectively. The programme is aimed primarily at ensuring an efficient quality management in construction and taking corrective actions when necessary for continuous improvement. When formulating quality assurance programme goals, special attention shall be paid to achieve the quality of civil structures and construction which ensure KK NPP safety and reliable operation and that its design construction schedule are met and economic efficiency is achieved.

Planning and detailed written procedures are essential for specifying how such activities as the following, which affect quality, are to be performed and controlled.

- a) Design management whenever applicable
- b) Procurement
- c) Construction
- d) Special processes
- e) Measuring and testing equipment
- f) Inspection and test
- g) Handling, storing, preservation, packaging and shipping
- h) Item identification and traceability
- i) Documentation and quality records
- j) Disposition of non-conformances and corrective action

2 Applicability

The requirements of this chapter apply to the construction activities specified in this contract.

3 Contractor's Responsibilities

- a) To develop and implement the controls and quality assurance procedures specified herein, that will promptly detect and dispose off, or prevent non-conformances to contractual requirements.
- b) To comply with the NPCIL's requirements as specified in the contract.
- c) To prepare a quality assurance manual which shall be submitted for the Engineer's concurrence before the contract is awarded or at the latest before the work starts.
- d) To prepare a quality plan which shall be submitted to the Engineer before the start of work.
- e) To update and resubmit the quality assurance manual and quality plan to reflect current practices when significant changes occur in the Contractor's programme or organization in order to improve its effectiveness or to prevent recurrence of non-conformances.
- f) To initiate corrective measures promptly when the quality assurance representative notifies the Contractor of deviations from established requirements.

4 Quality Assurance Programme

The Contractor shall plan, establish, implement and maintain a quality assurance programme that complies with the requirements of this chapter.

Graded approach shall be adopted based on the importance to nuclear safety in construction/erection activities.

Maintain the working environment such that the work can be carried out safely. The factors shall be identified which influence the work.

All the personnel employed for KK NPP works shall be adequately qualified to perform the works and they shall be given regular training.

5 Organisation

The Contractor shall:

- a) Clearly define management policies, objectives and responsibilities for quality assurance, including the responsibility of each division within a multi-divisional organisation. The policy statement shall include a commitment that the top priority in construction and erection activity is NPP safety. An organization chart shall be submitted indicating responsibility and authority of each individual at different levels with respect to performance of work and assurance of quality.
- b) Define the scope of various works, which he intends to subcontract. A separate interface chart of Contractor/his Sub Contractors and NPCIL shall be prepared and submitted for approval of Engineer.
- c) Provide for the review by management of the status and adequacy of the adopted quality assurance programme. Contractor shall appoint a management representative for quality.
- d) The head of the Contractor's quality assurance group shall be at a sufficiently higher level so as to ensure that quality assurance requirements are not subordinated to design, manufacturing, construction or delivery. He shall directly report to the head of the site management.

The organisation chart of quality assurance division shall be submitted which shall clearly indicate specialised subdivisions such as civil laboratories, NDT laboratories/mechanical testing laboratories.

- e) The personnel who are responsible for quality control shall have organisational independence to:
 - Identify and record quality problems.
 - Initiate or recommend or provide solutions through designated channels.
 - Verify the implementation of non-conformance dispositions.

- Control further processing, delivery or installation of a non-conforming item or service until the deficiency or unsatisfactory condition has been resolved.
- Stop the activity in cases of non-compliance of QA requirements specified.

The personnel responsible for quality control and audit shall not be directly responsible for performance and progress of the work.

The examinations being a part of the whole inspections, are performed and documented by works personnel. However QC inspectors shall verify the conformance to the specifications and drawings. In cases of problems or difficulties they shall request clarification from the design or other competent organizations and initiate appropriate measures.

6 Quality Assurance Documents

a) Quality Assurance Manual

(i) The Contractor shall:

- Prepare a quality assurance manual, approved and signed by a senior management official, and submit it for the Engineer's concurrence before the contract is awarded or at the latest before the work starts.
- Review and update the manual to reflect current quality assurance policies and procedures and resubmit the revised manual.
- Implement the programme according to the provisions specified in the manual.
- The quality assurance manual shall deal as appropriate with the following:
 - Organisation: The manual shall define the organisational setup, authorities and responsibilities of individuals.
 - Quality plan: The manual shall give detailed quality plan for the work and identify the group responsible for the performance and verification.

- Quality assurance procedures: List of quality assurance procedures shall be included or shall be outlined and cross-referred. These procedures shall be got approved by Engineer before starting each activity of work.
- The manual shall address about handover and transfer of responsibilities between the Contractor and his Sub Contractor on completion of work along with Construction Completion Certificates (CCC) in the format approved by NPCIL. The Contractor shall consolidate and hand over CCCs to NPCIL.
- Audits: Manual shall outline the audits during the performance of the work for verification of compliance and effectiveness of the quality assurance programme. Both internal and external audits shall be carried out. Details such as periodicity of audits, auditing organisation, compliance with the recommendations of audit report etc shall be clearly brought out.
- Manual review: A statement shall be incorporated for review and updating the manual.

A suggested structure of QA manual to be prepared by the Contractor is given in Annexure-1 to this section.

b) Quality Plan

i) The Contractor shall:

- Plan the inspection and test activities.
- Identify in the quality plan the inspections and tests to be performed for the items listed in the contract, in compliance with contractual and technical requirements.
- Submit the plan for the Engineer's concurrence following the award of contract and before the work starts. Referenced inspection and

specifications and/or procedures shall be made available to quality assurance representative during the implementation of the plan.

- Update the plan during the life of the contract to reflect current condition of manufacturing, construction, inspecting and testing and resubmit them to the Engineer.

ii) The quality plan shall deal with:

- Identification of the characteristics or items to be inspected and tested.
- Identification of required inspection, test and special process operation and their timing in the construction cycle. Check points shall be clearly indicated. The Contractor may include additional in-process inspection points for his own evaluation of quality. The plan shall clearly identify the critical path in the activity, if any, the type of check, extent of check, category for the item, type of record, executing agency etc.
- Reference to inspection, test and special process procedural standards, acceptance criteria and sampling plan, if any.
- Indication of hold points beyond which the activity shall not proceed until the required inspection or tests have shown satisfactory results and have been documented.
- Provisions for NPCIL to insert witness points at which activities are to be observed.
- Provision for post execution inspection.

iii) The quality plan for subcontracted items, shall be in line with that of the main Contractor. This shall be concurred by the Contractor and submitted for approval of Engineer.

c) Quality Assurance Procedures

The Contractor shall prepare procedures for the following:

- Document control

- Procurement control
- Control of measuring and testing equipments
- Inspection and tests for various stages of work
- Different items of fabrication/erection / assembly
- Work execution procedures for activities of construction work
- Post execution inspection
- Identification and traceability of items of materials / work
- Control of items
- Preservation, handling and storage of materials, equipment and documents
- Special processes
- Quality records: generation and preservation
- Non-conformance control
- Corrective actions
- Quality audit

Each QA procedure shall define responsibility of individuals, materials, and equipment and documentation system.

The QA procedures shall have necessary formats used for the record during execution and inspection.

All the procedures shall be submitted to the Engineer for his approval well in advance of the start of the particular activity.

The approved procedure shall clearly indicate the title, document no., revision no., date of issue and distribution list.

QA procedures shall be updated as and when necessary for continuous improvement.

7 Procurement Control

The Contractor shall develop a procurement control procedure and shall ensure that all the materials/equipments used in the construction of KK NPP are tested and qualified. In case of procurement of items/materials, the necessary procurement requirement, quality requirement, acceptance requirement and documents to be supplied shall form part of the procurement document. Necessary document control procedure shall be developed for any change in the procurement documents.

8 Document Control

The Contractor shall:

- Establish measures to ensure that all essential documents are reviewed for adequacy and approved for release by those authorised.
- Establish distribution lists for all documents; update and maintain them in the current form to assure that the proper personnel are issued with the right documents necessary to perform the work (controlled and uncontrolled copies).
- Make the necessary documents available at areas where these activities are performed.
- Establish and update list of applicable documents for construction and distribute them systematically.
- Maintain list of codes, guides, procedures, instructions etc used for construction activities.
- Ensure that changes to documents receive the authorizations by the same organizations as the initial documents unless other organizations are specially designated. Maintain a record of changes as they are made. Documents shall be revised and re-issued after a number of changes have been issued. Document change control procedure shall be established.

- Obsolete documents shall be retrieved from all the places where it is issued and revised documents shall be issued. Record of all issues and retrievals shall be maintained.

9 Sub Contractor's Works

The Contractor shall define clearly the interfaces (both organisational and technical) between him and his Sub Contractors indicating work boundaries in a graphic form. Following shall be considered.

a) Selection of Sub Contractors

The Contractor shall identify the items to be subcontracted, with the consent of the Engineer. He shall undertake the following:

- Determine for these Sub Contractor items the applicable quality management requirements. Classification of these quality management requirements shall be in such a way that the overall quality is not impaired.
- Evaluate and select Sub Contractors in accordance with the applicable quality management requirements with regard to their ability to execute the work and satisfy quality requirements.

Approval of the Engineer is essential for the final selection of sub Contractor.

b) Subcontract Requirements:

The Contractor shall include in subcontracts the following requirements.

- A clear description of the items or services to be procured / executed including technical data and inspection and test requirements, acceptance criteria, technical specifications, drawings etc.
- A designation of the applicable quality management requirements to be applied to the items / works.
- A designation of the Contractor's QA procedures to be implemented by the Sub Contractor, if applicable.

- Instructions for the submission, retention and disposition of quality records.
- Requirements for packaging and shipping, where applicable.
- A statement related to the right of access to the Sub Contractor's premises and records for audit and/or surveillance by the Contractor and/or the Engineer.
- Instructions for notification of witness points.
- Requirements for the Sub Contractor to report non-conformances.
- The Sub Contractor shall submit his QA programme for the items of work executed by him, which shall be in line with overall QAP of the main Contractor. The QAP of the Sub Contractor shall be reviewed and approved by the main Contractor and submitted to the Engineer for NPCIL approval.

The Contractor shall:

- i) Identify and inspect items / materials on receipt at site to ascertain that they comply with contractual requirements. Inspection shall cover as a minimum verification of deterioration or damage during transport, identification control, and review of required documentation.
- ii) Initiate corrective action with Sub Contractors when non-conforming items / materials are received.
- iii) Hold incoming items / materials until the required inspection and/or test have been completed or the necessary inspection and/or test reports have been received and verified.

10 Control of Measuring and Testing Equipment

All measuring and testing equipment devices used to verify characteristics that can affect item quality shall be controlled and maintained. At prescribed intervals, or prior to use, they shall be calibrated and adjusted against certified equipment having a known valid relationship to nationally recognized standards. Where no national

standards exist, the basis employed for calibration shall be concurred with the Engineer and documented.

The Contractor shall:

- a) Include in the calibration procedures, equipment type, frequency of checks, description of check method, acceptance criteria and action to be taken when results are unsatisfactory. List of all equipments shall be made.
- b) Identify all measuring and testing equipments with a tag, sticker, or other suitable indicator to show the calibration status.
- c) Maintain calibration records for measuring and testing equipment.
- d) Assess and document the validity of previous inspection and test results when measuring and testing equipment are found to be out of calibration.

The above mentioned requirements are applicable to all equipments and instruments.

11 Inspection and Test for Various Stages of Work

- a) The Contractor shall provide for the performance of inspections and tests as specified in the quality plan. These inspections and tests shall be carried out in accordance with written procedures that define the method, materials, instruments or equipment to be used, regulating documents, inspection schedule, inspection result record format, flow chart of inspection activity and acceptance/rejection criteria.

The Contractor may amend the selected inspection methods in concurrence with Engineer in cases where their unsuitability is demonstrated.

- b) Inspections and tests shall be documented on inspection and test reports that identify as minimum the item inspected or tested, applicable drawings, specifications or procedures, the date of inspection or test, the inspector, tester or data recorder, the type of observation, the results, the acceptability/or not and the action taken in connection with any deficiencies identified.

12 Inspection During Execution

The Contractor shall:

- a) Ensure that the work is executed as per quality assurance procedure.
- b) Identify, inspect and/or test items as required by the quality plan.
- c) Monitor execution methods, where inspection is not feasible.
- d) Hold items until the required inspections and /or tests have been completed or necessary reports have been received and verified.
- e) Observe all the check points, hold points and witness points as specified in quality plan.

13 Post Execution Inspection

- a) Contractor shall Identify, inspect and/or test the completed item as required by the quality plan. Suitable formats for the post execution inspection shall be developed for recording the inspection findings.
- b) Contractor shall verify that the item has been inspected at all points shown in the quality plan and that the records are adequate and complete.

14 Inspection Requirements

The Contractor shall:

- a) Provide means for assuring that required inspections and tests are performed and that the acceptability of items with regard to inspections and tests performed is known throughout manufacturing and construction. He shall provide all the necessary support to the quality inspector of NPCIL to carry out inspection during the work.
- b) Establish and maintain a system for identifying the inspection/acceptance status by means of tags, stamped impressions, or other physical means to be affixed to the item or its container or by means of inspection records.
- c) Identify non-conforming items.

15 Control of Items

Identification and Traceability of Items of Material/Work

The Contractor shall develop and implement system to:

- a) Identify all incoming materials with respect to their batch/lot numbers and test certificates, which shall be identifiable through the whole construction process.
- b) Identify each item (lot, component or part) to the applicable drawing, specification or other technical document, throughout the whole construction process.
- c) Assign to each item a unique identification/markings.
- d) Record this identification on all process, inspection and test records.
- e) List the items that require traceability.
- f) Segregate conforming/non-conforming items.

16 Preservation, Handling and Storage

The Contractor shall:

- a) Establish, maintain and document a system for the preservation, storage and handling of all items from the time of receipt through the entire construction process and subsequent storage to prevent abuse, misuse, damage, deterioration or loss.
- b) Periodically inspect stored items for conditions and shelf-life expiry.
- c) Inspect and test-special handling tools and equipment at specific times to verify that the tools and equipment are adequately maintained and will not damage the items and will ensure safe and adequate handling.
- d) Use specific written procedures for lifting of critical or high value items.
- e) Define conditions of storage (outdoor, indoor, air-conditioned), order of loading/reloading and transportation.
- f) Appoint a qualified, responsible person to manage the above.

17 Construction

- a) The Contractor shall clearly define the responsibilities for the documented procedure of works.

The written procedures shall consist of instructions or work assignments, which shall be established in accordance with the construction schedules, and be available to the works and inspection personnel prior to commencement of work. This work procedure consist of the following:

- a. Work methods
 - b. Sequence of operations
 - c. Workmanship criteria
 - d. Type of equipment needed
 - e. Special working environment, if any.
 - f. Measures for quality assurance/Inspection requirements.
 - g. Documents to be generated during execution
- b) The Contractor shall ensure that prior to release for construction all jigs and fixtures, tools templates, and patterns used for verifying quality are controlled. The extent and frequency of tool control shall be defined.

18 Special Processes Execution

The Contractor shall:

- a) Identify all special processes, which require specialised methods of construction. Special processes shall include prestressing, epoxy painting, reinforcement splicing, water proofing, grouting, fire protection, heat and sound insulation, welding and non-destructive examination etc, as applicable.
- b) Establish documented procedures to assure that these processes are accomplished under controlled conditions by qualified personnel using qualified documented procedures and suitable equipment in accordance with applicable codes, standards, specifications, criteria and contractual requirements.

- c) Maintain documentation for personnel qualification and approval of Engineer for the scheme of construction according to the requirement of pertinent codes and standards.
- d) Define the necessary qualifications of personnel and procedures for special processes not covered by existing codes or standards, or where item or service quality requirements exceed the requirements of established codes or standards.

19 Quality Records

The Contractor shall:

- a) Maintain quality records as evidence that:
 - The quality assurance programme meets the quality management requirements (manual, procedures, and quality plan).
 - The item or services meet contractual or other applicable technical requirements (specifications, drawings, calculations, and manufacturing, inspection and test procedures).
 - Procedures for special processes and persons to execute special process are qualified.
 - The personnel are trained/ re-trained.
 - Measuring and testing equipment is calibrated.
 - The procurements meet the requirements.
 - Corrective action is being taken and is effective as required.
 - Audits are performed as required.
- b) Maintain final performance quality records, which include:
 - As built records such as, as-built construction drawings.
 - Material test reports or certificates.
 - Non-destructive examination records.
 - Inspection and test records including:
 - a. Non-conformance reports.

- b. Specific records of work execution (such as batching plant records of concrete, prestressing records etc).
- c) Identify, list, index and file quality records for easy retrieval.
- d) Retain quality records for the time specified in the contract.

The documents shall be classified as permanent and temporary. All the quality records shall be listed under appropriate category depending upon their importance to safety. They shall be stored properly depending upon their specified period of storage with identification marks for early retrievability.

- e) Provide a suitable environment for storing of records to minimise deterioration or damage and to prevent loss.

20 Non-Conformances

The Contractor is responsible for the identification and disposition of all non-conforming items, including those of Sub Contractors. Final acceptance of the Contractor's disposition of those items that violate contractual requirements is the prerogative of the Engineer. The Contractor shall:

- a) Establish and maintain measures for controlling non-conforming items as follows:
 - Define the responsibility and authority of those who dispose-off non-conforming items. This shall include provision for a technical review that involves those who are responsible for design, manufacturing, construction and quality functions, if these functions are concerned.
 - Detect and record the non-conformances and promptly bring to the notice of Engineer.
 - Identify and hold non-conforming items from being used in subsequent works.
 - Develop a non-conformance disposition and corrective/preventive action implementation procedure.

- Implement accepted dispositions. This shall include requirements for re-inspecting and retesting of repaired and reworked items, with proper documentation.
 - Verify the implementation of accepted disposition.
 - Bring immediately to the notice of the Engineer the safety related non-conformances and dispose them after review of Engineer.
- b) Provide holding areas or methods for segregating non-conforming items to prevent unauthorized use, shipment, or mixing with conforming items. However, where physical segregation is not practical or the non-conformance is not clearly visible from storage, marking or other positive means of identification is acceptable.
- c) Maintain records that identify non-conforming items, the nature and extent of non-conformance, its disposition and objective evidence that repaired and reworked items have been re-inspected or retested as per approved procedure.
- d) Prepare consolidated list of all non-conformances and corrective actions and shall submit the same to NPCIL on a quarterly basis.

21 Corrective Actions

The Contractor shall:

- a) Investigate the causes of significant or recurring non-conformances and take appropriate action to prevent repetition.
- b) Document and have reported to appropriate levels of the Contractor's management causes of significant conditions that adversely affect quality and the corrective action taken.

22 NPCIL Supplied Items

The NPCIL is responsible for the quality of its materials supplied to the Contractor. However, the Contractor shall:

- a) Examine NPCIL supplied items on receipt for completeness and proper type and to detect transit damage. The materials shall be identified w.r.t the test

certificates supplied. Examination may be deferred until further processing is scheduled if items are in sealed containers or have specific preservation or packing.

- b) Control NPCIL supplied items for receipt onwards according to the requirements of this contract.
- c) Report promptly in writing to the quality assurance representative, if any NPCIL supplied items found damaged, lost, non-conforming or otherwise unsuitable for use either on receipt or while in the Contractor's custody.

23 Quality Assurance Programme, Facilities and Physical Resources

Prior to the award of this contract and to the performance of the activity, the Engineer will evaluate the Contractor's quality assurance programme, manufacturing facilities and resources to determine whether the requirements of this section can be met. If the Contractor is found deficient in meeting any of the requirements, then he shall take appropriate steps in fulfilling these items before award of contract.

24 Audits

The Contractor shall carry out internal audits at regular interval on the works being executed by him and his Sub Contractors as per the approved audit procedure. The audit findings shall be reported to NPCIL.

NPCIL or its authorised representative will carry out external audits on the Contractor's and Sub Contractor's work as per the audit schedule.

25 Evaluation of Quality Assurance Programme

NPCIL shall evaluate the quality assurance programme of Contractor in order to determine its acceptability. All the check, hold and witness points indicated in the quality plan shall be evaluated periodically for their effectiveness. Based on this evaluation, QA plan shall be revised to the satisfaction of NPCIL.

NPCIL shall indicate its witness points on the accepted quality plan. In addition, NPCIL shall perform surveillance according to the accepted quality plan.

26 Access

The Contractor shall provide all necessary help to the quality inspectors of NPCIL/its representatives in carrying out their responsibility. Free access of NPCIL and its representatives to his premises and records for audit and surveillance purposes shall be provided by the Contractor.

Annexure - IIIA-1

A suggested structure of Contractor's QA manual

QUALITY POLICY**1.0 INTRODUCTION**

- 1.1 General
- 1.2 Application Area
- 1.3 Responsibility
- 1.4 Licenses

2.0 QUALITY ASSURANCE PROGRAM

- 2.1 General
- 2.2 Procedures, Instructions, Drawings
- 2.3 Revision of QA program
- 2.4 Resolution of conflicts
- 2.5 Human Factors

3.0 ORGANISATION

- 3.1 Responsibilities, Authorities & Communications
- 3.2 Organisational interfaces
- 3.3 Selection & Training of personnel

4.0 DOCUMENT CONTROL

- 4.1 Objective
- 4.2 Preparation, Consideration & Approval
- 4.3 Document issue & Distribution control
- 4.4 Document change control

5.0 DESIGN CONTROL – (IF APPLICABLE)

- 5.1 General
- 5.2 Distribution of responsibilities & interfaces
- 5.3 Design process control
- 5.4 Design verification
- 5.5 Design validation
- 5.6 Design change control

6.0 PROCUREMENT CONTROL

- 6.1 General
- 6.2 Suppliers evaluation & selection
- 6.3 Control of procured items

7.0 CONTROL OF ITEMS

- 7.1 Identification & control of materials components & units
- 7.2 Items handling, storage & transportation
- 7.3 Maintenance

8.0 PROCESS CONTROL

- 8.1 Objective
- 8.2 List of processes & special processes subject to control
- 8.3 Responsibility for QA for processes execution

9.0 INSPECTION & TEST PROGRAM

- 9.1 Inspection & Test program
- 9.2 Calibration & control of inspection & test equipment (metrological control)
- 9.3 Status inspection results

10.0 NON CONFORMANCE CONTROL

- 10.1 General
- 10.2 Non-conformance review & disposition

11.0 CORRECTIVE/PREVENTIVE ACTION**12.0 QUALITY RECORDS**

- 12.1 QA records system
- 12.2 QA documents acquisition & storage

13.0 AUDITS

- 13.1 General
- 13.2 Audit planning
- 13.3 Internal Audit
- 13.4 External Audit
- 13.5 Audit report
- 13.6 Audit follow up

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- 1 DEFINITIONS
- 2 LIST OF CODES, STANDARDS & PRACTICES
- 3 ORGANISATIONAL CHART INDICATING INTERFACES
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- 5 LIST OF SUB-CONTRACTORS & THEIR INTERFACES

SECTION IV
GENERAL CONDITIONS OF CONTRACT

GENERAL CONDITIONS OF CONTRACT

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1 GENERAL PROVISIONS

1.1 Definitions

- 1.1.1 **"Accepting Authority"** shall mean the authority mentioned in Schedule "A".
- 1.1.2 **"Corporation"** shall mean Nuclear Power Corporation of India Ltd. (NPCIL) and include its legal representatives, successors and permitted assigns.
- 1.1.3 **"Contract"** shall mean an agreement where a proposal has been accepted and shall include notice inviting the tender, the tender and acceptance thereof and the formal agreement, if any, executed between Nuclear Power Corporation of India Ltd and the Contractor together with the documents referred to therein including these conditions with appendices and any special conditions, specifications, designs, drawings, schedule of quantities with rates and amounts. All these documents taken together shall be deemed to form one contract and shall be complementary to one another.
- 1.1.4 **"Contractor"** is a person(s) named as contractor in the work order / agreement and its legal successors.
- 1.1.5 **"Contract Price"** shall mean:
- (i) in the case of **"Lumpsum Contracts"**, the sum for which the tender is accepted
 - (ii) in the case of **"Item Rate Contracts"**, the cost of the works arrived at after extension of quantities shown in Schedule of Quantities by the item rates quoted by the tenderer for various items.
- 1.1.6 **"Commissioning"** means the trial/initial operation of the works / facility or any part thereof by the contractor, for the purpose to demonstrate successful operation of the facility as per contract provisions.
- 1.1.7 **"Completion Certificate"** means the certificate issued by the Corporation on completion of works in accordance with sub clause 8.1 (Completion Certificate).
- 1.1.8 **"Completion Time"** means the time within which completion of the works or part (where a separate time of completion of such part has been prescribed) is to be completed as stipulated in the work order and in accordance with the provisions of contract.
- 1.1.9 **"Contract Documents"** means documents listed in the Contract Agreement including any amendments therein to.
- 1.1.10 **"Contractors' Equipment"** means all apparatus, machineries, vehicles and other things required for the execution and completion of the works and the remedying of any defects. However, contractors equipment excludes temporary works, employers equipment (if any), plant, materials and any other things intended to form or forming part of the works.
- 1.1.11 **"Contractors' Representative"** means the person nominated or appointed time to time by the contractor who acts on behalf of the contractor.

- 1.1.12 **"Corporations' Tools & Plants"** means the apparatus, machinery, tools, plants and vehicles (if any) made available by the Corporation for the use of the contractor in the execution of the work but it does not include plants which has not been taken over by the Corporation.
- 1.1.13 **"Country"** means the country in which the site is located where the works are to be executed.
- 1.1.14 **"Date of Commencement"** means the date when the contractor shall commence execution of the works as mentioned in the work order and the completion time for the work shall be reckoned from this date.
- 1.1.15A **"Day"** means a day of 24 hours from mid-night to mid-night irrespective of the number of hours worked in that day, a **"Week"** means seven days, a **"Month"** means a calendar month and a **"Year"** means 365 days without regard to the number of hours worked in any day.
- 1.1.16 The **"Defect Liability Period"** is the period defined in the Schedule "A" during which the contractor is responsible for defects with respect to the works as provided in GCC clause No. 9 (Defect Liability).
- 1.1.17 **"Defect"** means any part of the Works not executed in accordance with the Contract.
- 1.1.18 **"Drawings"** means the drawings of the works, as included in the Contract, and any additional and modified drawings issued by (or on behalf of) the Corporation in accordance with the Contract.
- 1.1.19 **"DRB"** means the Dispute Resolution Board appointed under sub-clause 17.3 (Appointment of the Dispute Resolution Board).
- 1.1.20 **"Engineer-in-Charge"** shall mean the Officer appointed by the Corporation or his duly authorized representative who shall direct, supervise and be in charge of the works for purposes of this Contract.
- 1.1.21 **"Excepted Risks"**, are the risks due to riots (other than that among Contractor's employees) and civil commotion (in so far as both these are uninsurable), war (whether declared or not), invasion, act of foreign enemies, global terrorism, civil war, rebellion, munitions of war, explosive materials, ionizing radiation or contamination by radio activity, revolution, insurrection, military or usurped power, any acts of Government, damage from aircrafts, sabotage, acts of God such as earthquake, lightning, cyclones, Tsunami and unprecedented floods and other causes over which the Contractor has no control and accepted as such by the Accepting Authority or causes solely due to use or occupation by the **"Corporation"** of the part of Works in respect of which a certificate of completion has been issued.
- 1.1.22 **"GCC"** means the General Conditions of Contract.
- 1.1.23 **"Latent Defects"** shall mean any defects which exists but has not surfaced at the time of testing and has not manifested during defect liability period.
- 1.1.24 **"Laws"** means all national (or state) legislation, statutes, ordinances and other laws and regulations and by-laws of any legally constituted public authority.

- 1.1.25 **"Local Currency"** means the currency of India. **"Foreign Currency"** means a currency in which part (or all) of the Contract Price is paid in currency other than the Local Currency.
- 1.1.26 **"Market Rate"** shall be the rate as decided by the Engineer-In-Charge on the basis of the cost of materials and labour at the Site where the work is to be executed, plus 10 % to cover all overheads and profit. For material issued by the Corporation, the overheads and profit percentage shall be allowed @ 2.5%.
- 1.1.27 **"Minimum Wages"** shall be the minimum wages declared from time to time by the state or central government, whichever is higher.
- 1.1.28 **"Near Relatives"** means wife, husband, parents and grand parents, children and grand children, brothers and sisters, uncles and aunts, cousins and their corresponding in-laws.
- 1.1.29 **"Part Completion Certificate"** means the certificate issued by the Corporation on completion of items or group of items for which separate period of completion have been specified in the contract, issued in accordance with Sub clause 8.1 (Completion Certificate).
- 1.1.30 **"Party"** shall mean Corporation or Contractor, as the context requires.
- 1.1.31 **"Performance Guarantee"** is the guarantee to be submitted by the Contractor to the Corporation in accordance with sub-clause No. 4.2.3 (Performance Guarantee).
- 1.1.32 **"Pre-Commissioning"** means the testing, checking and other requirements specified in the technical specifications that are to be carried out by the contractor in preparation for commissioning.
- 1.1.33 **"Retention Money"** means the accumulated retention money which the Corporation retains from the Running Bills as specified in sub-clause No. 4.2.5 (Retention Money)
- 1.1.34 **"Schedule(s)"** referred to in these conditions shall mean the relevant schedule (s) annexed to the tender papers issued by the Corporation.
- 1.1.35 **"Scheduled Commercial Bank"** in India as per definition of Reserve Bank of India shall include of the following bank groups (i) State Bank of India and its associates, (ii) Nationalized Banks, (iii) Regional Rural Banks, (iv) Foreign Banks and (v) Other Indian Scheduled Commercial Banks (in the private sector).
- 1.1.36 **"Site"** means the places where Works are to be executed, including storage and working areas, and to which Plant and Materials are to be delivered and any other places as may be specified in the Contract as forming part of the Site .
- 1.1.37 **"Specification"** means the specification of the works included in the contract and any modification / addition made or approved by the Engineer-in-charge.
- 1.1.38 **"Sub-Contractor"** means any person named in the Contract as a Sub-Contractor, or any person appointed as a Sub-Contractor, for a part of the Works; and the legal successors in title to each of these persons. Piece rate Contractors are not to be considered as Sub-Contractor.
- 1.1.39 **"Temporary Works"** shall mean all temporary works of every kind required in or

about the execution, completion or maintenance of the Works.

1.1.40 **"Urgent Works"** shall mean any urgent measures which, in the opinion of Engineer-in-Charge, become necessary during the progress of Work to obviate risk of accident or failure or which become necessary for security and safety.

1.1.41A **"Variation"** is an instruction / communication given by Engineer-in-charge or his representative, which varies the works.

1.1.42 **"WCMS"** shall mean the Work contract Management system software used by NPCIL for handling works contract.

1.1.43 **"Work order"** is the formal communication by the Corporation to the bidder whose bid has been accepted

1.1.44 **"Works"** shall mean the works to be executed in accordance with the Contract or part(s) thereof as the case may be and shall include all extra or additional, altered or substituted works as required for execution of the Contract. It shall include variations and urgent works.

Any term which is not defined herein but defined under different enactment shall be construed to have the same meaning as defined in the act.

1.2 Interpretation

In the Contract, except where the context requires otherwise:

- (a) words indicating one gender include all genders;
- (b) words indicating the singular also include the plural and vice versa;
- (c) the word "tender" is synonymous with "bid", "tenderer" with "bidder" and "tender documents" with "bidding documents"; and
- (d) 'written' or 'in writing' means hand-written, type-written, printed or electronically made, which would be produced physically as an evidence for the communication.

The marginal words and other headings shall not be taken into consideration in the interpretation of these Conditions.

1.3 Law and Language

1.3.1 The contract shall be governed by the law of the country or other jurisdiction stated in the contract. The country unless otherwise stated in the contract shall be India.

1.3.2 The ruling language of the contract shall be English unless otherwise stated in the Contract.

1.4 Priority of Documents

1.4.1 In the case of discrepancy between Schedule of Quantities, the special conditions, the Specifications and/or the Drawings, the following order of preference shall be observed:

- (a) Description in Schedule of Quantities and rates
- (b) Special Conditions of Contract, if any
- (c) Drawings

(d) Technical specifications

(e) General Conditions of Contracts

1.4.2 Any inadvertent error in description, quantity or rate in Schedule of Quantities or any omission there from shall not vitiate the Contract or release the Contractor from the execution of the whole or any part of the works comprised therein according to terms and conditions or from any of his obligations under the Contract.

1.4.3 If there are varying or conflicting provisions made in any one document forming part of the contract, the Accepting Authority shall be the deciding authority with regard to the intention of the document.

1.5 Contractor's Documents for use by Corporation

1.5.1 The Contractor shall maintain at his Site Office all drawings, specifications and other Contract documents and any other supplementary data complete with all the latest revisions thereto. The Contractor shall also maintain, in addition, the continuous record of all changes to the above Contract documents, drawings, specifications, supplementary data, etc. effected at the site. Whenever called by Engineer-in-charge, the Contractor shall incorporate all such changes on the drawings and other engineering data to indicate actual construction/fabrication and erection carried out under the Contract. Two copies of such revised / updated drawings and engineering data shall be submitted to the Engineer-in-Charge along with the soft copies on completion of his total assignment or the milestones as specified under the Contract.

1.5.2 The Contractor shall be deemed (by signing the Contract) to give to the Corporation a non-terminable transferable non-exclusive royalty-free license to copy, use and communicate the Contractor's Documents, including making and using modifications of them. This license shall:

- (a) apply throughout the actual or intended working life (whichever is longer) of the relevant parts of the Works,
- (b) entitle any person in lawful possession of the relevant part of the Works to copy, use and communicate the Contractor's Documents for the purposes of completing, operating, maintaining, altering, adjusting, repairing and demolishing the Works, and
- (c) in the case of Contractor's Documents, which are recorded in computer programs and other software, permit the access to the data through any computer on the Site.

1.5.3 The Contractor's Documents and other design documents made by (or on behalf of) the Contractor shall not, without the Contractor's consent, be used, copied or communicated to a third party by (or on behalf of) the Corporation for purposes other than those permitted under this sub-clause.

1.6 Corporation's Documents for use by Contractor

1.6.1 The Corporation shall retain copyright and other intellectual property rights of their Specification, the Drawings and other documents made by (or on behalf of) the Corporation. The Contractor may, at his cost, copy, use, and

obtain communication of these documents for the purposes of the Contract. They shall not, without the Corporation's consent in writing, be copied, used or communicated to a third party by the Contractor.

1.7 Confidential Details

- 1.7.1 The Contractor shall take necessary steps to ensure that all persons employed on any work in connection with this Contract have noticed that the Indian Official Secrets Act, 1923 (XIX of 1923) applies to them and shall continue to apply even after the execution of such works under the Contract.
- 1.7.2 The Contractor's and the Corporation's Personnel shall disclose all such confidential and other information as may be reasonably required in order to verify compliance with the Contract and allow its proper implementation.
- 1.7.3 Each of them shall treat the details of the Contract as private and confidential, except to the extent necessary to carry out their respective obligations under the Contract or to comply with applicable Laws. Each of them shall not publish or disclose any particulars of the Works prepared by the other Party without the previous agreement of the other Party. However, the Contractor shall be permitted to disclose any publicly available information, or information otherwise required to establish his qualifications to compete for other projects.

1.8 Compliance with Law

- 1.8.1 The Contractor shall, in executing the Contract, comply with applicable Laws. Unless otherwise stated:
 - (a) the Corporation shall have obtained (or shall obtain) the planning, zoning, building permit or similar permission for the Permanent Works, and any other permissions described in the Specification as having been (or to be) obtained by the Corporation; and the Corporation shall indemnify and hold the Contractor harmless against and from the consequences of any failure to do so; and
 - (b) the Contractor shall give all notices, pay all taxes, duties and fees, and obtain all permits, licenses and approvals, as required by the Laws in relation to the execution and completion of the Works and the remedying of any defects; and the Contractor shall indemnify and hold the Corporation harmless against and from the consequences of any failure to do so, unless the Contractor is impeded to accomplish these actions and shows evidence of its diligence.

1.9 Changes in Constitution

- 1.9.1 Where the Contractor is a partnership firm, Joint Venture, collaborate or consortium, prior approval in writing of the Accepting Authority (defined by the Corporation) shall be obtained before any change is made in the constitution of the firm. Where the Contractor is an individual or a Hindu Undivided Family business concern such approval as aforesaid shall likewise be obtained before the Contractor enters into any partnership firm which would have the right to carry out the work hereby undertaken

by the Contractor.

- 1.9.2 Where the Contractor is a partnership firm, Joint Venture, collaborate or consortium partnership the Contractor shall intimate the Corporation of any change or modifications in the terms within their partnerships, which could happen between the submission of bids and awarding of bid. The Contractor shall obtain prior approval in case of any such change or modification happens during the currency of the contract.
- 1.9.3 If prior approval as aforesaid is not obtained, the Contract shall be deemed to have been assigned in contravention thereof and the same action may be taken as provided for in the said clause 13.2 (Determination/Cancellation of Contract).

1.10 Conflict of Interest

- 1.10.1 The Contractor shall not be permitted to tender for works in the NPCIL units (responsible for award and execution of work) in which his near relative is posted as an officer in any capacity.
- 1.10.2 He shall also intimate the names of persons who are working with him in any capacity or are subsequently employed by him and who are near relatives of any officer in the NPCIL.
- 1.10.3 He shall also intimate if any employee of the Corporation has or develops a financial or other interest of either with the Contractor or his company during the execution of the contract.
- 1.10.4 The Contractor shall also intimate if any of the employee of NPCIL has any financial interest in the Contractor's firm or company.

Any breach of the above conditions by the Contractor would render him liable for cancellation of the Contract.

1.11 Patent Indemnity

- 1.11.1 The contractor shall fully indemnify the Corporation against any action, claim or proceeding relating to infringement or use of any patent or design or any alleged patent or design rights and shall pay any royalties which may be payable in respect of any article or part thereof included in the contract. In the event of any claims made under an action brought against Corporation in respect of any such matters as aforesaid the contractor shall be immediately notified thereof and the contractor shall be at liberty, at his own expense, to settle any dispute or to conduct any litigation that may arise therefrom. Provided that the contractor shall not be liable to indemnify the Corporation in the infringement of the patent or design or any alleged patent or design right is the direct result of an order passed by the Engineer-in-charge.

2 THE CORPORATION

2.1 Possession of Site

- 2.1.1 The Contractor shall not be permitted to enter on (other than for inspection purposes) or take possession of the site until instructed to do so by the Engineer-in-Charge in writing. The portion of the Site to be occupied by the Contractor shall be defined and /or marked on the Site Plan, failing which these shall be indicated by the Engineer-in-Charge at site and the Contractor shall on no account be allowed to extend his operations beyond these areas.
- 2.1.2 It is deemed that the Contractor has inspected and has full knowledge of the site.
- 2.1.3 The Engineer-in-charge shall give the Contractor right of access to and possession of, part or all parts of the Site (as deemed necessary) within the time specified in the Schedule A.
- 2.1.4 If no such time is stated in the Contract, the Corporation shall give the Contractor right of access to, and possession of, the Site within such times as required to enable the Contractor to proceed without disruption in accordance with the program submitted.
- 2.1.5 The Corporation may withhold the action on giving the right of access to and possession of site to the Contractor till the Performance Guarantee and acceptance of work order has been received.

2.2 Permits, Licenses or Approvals

- 2.2.1 The Corporation shall provide, at the request of the Contractor, such reasonable assistance or direction, which shall be limited to the issue of necessary certificates as required under law so as to allow the Contractor to obtain the following:
- (a) copies of the Laws of the Country which are relevant to the Contract but are not readily available, and
 - (b) any permits, licenses or approvals required by the Laws of the Country which the Contractor is required to obtain under sub-clause 1.8 [Compliance with Law], for the delivery of Goods, including clearance through customs, and or the export of Contractor's Equipment when it is removed from the Site.
- 2.2.2 However, no claims can be made by the Contractor with respect to this clause.

2.3 Corporation's Personnel

- 2.3.1 The Corporation shall be responsible for ensuring that the Corporation's Personnel and the other Contractors deputed by Corporation at the Site:
- (a) co-operate with the Contractor's efforts under sub-clause 4.21 [Co-operation and Facilities to Other Contractors], and
 - (b) take or facilitate actions similar to those which the Contractor is required to take under Sub-Clause 5.6 [Health and Industrial Safety]

and Sub-Clause 4.13 [Protection of the Environment].

2.4 Corporation Claims

- 2.4.1 If the Corporation considers itself to be entitled to any payment under any Clause of these Conditions or otherwise in connection with the Contract, and/or to any extension of the defect liability period, the Engineer-in-charge shall give notice and particulars to the Contractor. However, notice is not required for payments due under Electricity, Water and Gas, Corporation's Equipment, Free-Issue Material and municipal taxes on land utilized for colony or for other services rendered by the Corporation.
- 2.4.2 The notice shall be given as soon as practicable after the Corporation became aware of the event or circumstances giving rise to the claim. A notice relating to any extension of the Defects Liability Period shall be given before the expiry of such period.
- 2.4.3 The particulars shall specify the Clause or other basis of the claim, and shall include substantiation of the amount and/or extension to which the Corporation considers itself to be entitled in connection with the Contract. The Corporation shall set off or deduct against amount due, or otherwise to claim against the Contractor.

3 THE ENGINEER-IN-CHARGE

3.1 Engineer-In-Charge's Duties and Authority

- 3.1.1 The Corporation shall nominate the Engineer-in-charge, who shall carry out the duties assigned to him in the Contract. The Engineer-in-charge's staff shall include suitably qualified engineers and other professionals who are competent to carry out these duties.
- 3.1.2 The Engineer-in-Charge is entitled to watch and supervise the works and to test and examine any materials to be used or workmen employed in connection with the works.
- 3.1.3 Engineer-in-charge shall also certify and release payments for the work done and make deductions as per the contract.
- 3.1.4 The Engineer-in-charge may exercise the authority attributable to the Engineer-in-charge as specified in or necessarily to be implied from the Contract. The Corporation shall promptly inform the Contractor of any change to the authority attributed to the Engineer-in-charge.
- 3.1.5 Except as otherwise stated in these Conditions:
 - (a) Whenever carrying out duties or exercising authority, specified in or implied by the Contract, the Engineer-in-charge shall be deemed to act for and behalf of the Corporation;
 - (b) Any approval, check, certificate, consent, examination, inspection, instruction, notice, proposal, request, test, supervision or similar act by the Engineer-in-charge (including absence of disapproval) shall not relieve the Contractor from any responsibility he has under the Contract, including responsibility for errors, omissions, discrepancies and non-compliances.

- (c) Any act by the Engineer-in-charge in response to a Contractor's request except otherwise expressly specified shall be notified in writing to the Contractor within 30 days of receipt.

3.2 Instructions of the Engineer-In-Charge

- 3.2.1 Subject as otherwise provided in this Contract, all notices to be given on behalf of the Corporation and all other actions to be taken on its behalf shall be given or taken by the Engineer-in-Charge or any Officer for the time being entrusted with the functions, duties and powers of the Engineer-in-Charge.
- 3.2.2 All instructions, notices and communications, etc. under the Contract shall be given in writing and if sent by registered / Speed post to the last known place of abode or business of the Contractor, shall be deemed to have been served.
- 3.2.3 The Contractor or his Agent shall be in attendance at the Site(s) during all working hours and shall supervise the execution of the Works with such additional assistance in each trade as the Engineer-in-Charge may consider necessary. Orders given to the Contractor's Agent shall be considered to have the same force as if they had been given to the Contractor himself.
- 3.2.4 The Contractor shall comply with the instructions given by the Engineer-in-charge or delegated representative, on any matter related to the Contract. Whenever practicable, their instructions shall be given in writing. If the Engineer-in-charge or a delegated representative:
- (a) gives an oral instruction,
 - (b) receives a written confirmation of the instruction, from the Contractor, within 2 working days after giving the instruction, and
 - (c) does not reply by issuing a written rejection and/or instruction within 7 working days after receiving the confirmation, then the confirmation shall constitute the written instruction of the Engineer-in-charge or delegated representative (as the case may be).

3.3 Replacement of the Engineer-In-Charge

- 3.3.1 If the Corporation intends to replace the Engineer-in-charge the Corporation shall intimate the Contractor of the name and designation of the intended replacement Engineer-in-charge.

4 THE CONTRACTOR

4.1 Contract Documents

- 4.1.1 The Specification and Drawings shall be in the custody and care of the Corporation. unless otherwise stated in the Contract, two copies of the Contract documents and three copies of each drawings shall be supplied to the Contractor free of charge.
- 4.1.2 Each of the Contractor's Documents shall be in the custody and care of the Contractor. The Contractor shall keep, on the Site, a copy of the Contract, publications named in the Specification, the Contractor's Documents (if any), the Drawings and Variations and other communications given under the

Contract. The Engineer-in-charge shall have the right of access to all these documents at all reasonable times.

- 4.1.3 If a Party becomes aware of an error or defect in a document which was prepared for use in executing the Works, the Party shall promptly give notice to the other Party of such error or defect

4.2 Security Deposit

- 4.2.1 Total Security Deposit (SD) shall be calculated as under

- (i) Contract value up to Rs.100 Crores - 10% of Contract Value.
- (ii) Contract value more than Rs. 100 Crores – 5% of Contract Value subject to a minimum of Rs 10 Crores.

Note: The contract value for the purpose of this clause shall be taken as the value of the contract awarded.

- 4.2.2 Security Deposit as calculated based on above parameters shall be split in the following of two parts and furnished accordingly;

- a) Performance Guarantee to be submitted on award of work (50% of Security Deposit), and
- b) Retention money to be recovered from Running Bills (50% of Security Deposit).

- 4.2.3 **Performance Guarantee:** The Contractor shall deliver the Performance Guarantee to the Corporation within 30 days after issue of work order. The Performance guarantee shall be issued by an entity and from within the country approved by the Employer, and shall be in the form of Bank Guarantee or FDR or any other form of deposit stipulated by the Corporation.

- 4.2.4 Failure of the successful bidder to comply with furnishing the performance guarantee within 30 days as stated above shall constitute sufficient grounds for cancellation of the award of work.

- 4.2.5 **Retention Money:** Retention Money shall be deducted at the rate of 6% of the value of work done from Running Bills till the 50% of Security Deposit amount so calculated as above, is built up. Total of Performance Guarantee & Retention Money should not exceed the amount of security deposit calculated as above.

- 4.2.6 When the retention money reaches the limit of 5 lakhs, the Contractor, if he so desires, may convert the amount into a Bank Guarantees as aforesaid.

- 4.2.7 In case a Fixed Deposit Receipt of any bank is furnished by the Contractor to the Corporation as part of the Security Deposit and the bank goes into liquidation or for any other reasons is likely to be unable to make payment against the said Fixed Deposit Receipt, the loss caused thereby shall be borne by the Contractor and the Contractor shall forthwith or on demand furnish additional security to the Corporation to make good the deficit.

- 4.2.8 The Corporation may deduct any sum of money payable by the Contractor under the terms of this Contract or any other Contract or any other account whatsoever from his security deposit. In the event of his security deposit amount being reduced by reasons of such deduction as aforesaid, the

Contractor shall within 10 days of receipt of notice of demand from the Engineer-in-Charge make good the deficit.

4.2.9 FDR / Bank Guarantee shall be accepted only from Scheduled commercial banks in India.

4.2.10 No interest will be paid on Security Deposit (Performance Guarantee and Retention Money).

4.3 Refund of Security Deposit

4.3.1 The retention money will be refunded to the Contractor after one month from the date of issue of Completion Certificate on receipt of request from the contractor, if as per the Engineer-In-Charge the balance amount of security deposit (Performance Guarantee) is sufficient to cover the Liabilities.

4.3.2 After the expiry of the Defects Liability Period, the balance amount of security deposit i.e. the Performance Guarantee shall be refunded by the Engineer-in-Charge to the Contractor. However, if any work remains to be executed under Clause 9 [Defects Liability], the Engineer-in-Charge shall withhold the estimated cost of such rectification work until it is executed.

4.4 Sub-contracts

4.4.1 The Contractor shall not sub-contract the work or any portion of the work without the prior written approval of the Engineer-in-Charge. Piece rate work shall not be deemed as sub-contract. Sub contracting does not alter the Contractor's obligations and responsibilities.

4.4.2 The Contractor shall not employ Sub-Contractor against whom the Engineer-in-charge raises reasonable objection by notice to the Contractor with supporting particulars.

4.4.3 The Contractor shall pay to the Sub-Contractor the amounts shown on the Sub-Contractor's invoices approved by the Contractor. The Corporation may pay, direct to the Sub-Contractor, part or all of such amounts which are due to the Sub-Contractor and for which the Contractor has failed to make the payment. The Contractor shall then repay, to the Corporation, the amount which the Sub-Contractor was directly paid by the Corporation with interest at prevailing rate. If the Contractor fails to repay, the same shall be adjusted against any dues payable to the Contractor along with interest for the intervening period. In this regard the decision of the Engineer-in-charge shall be final.

4.5 Construction Coordination

4.5.1 The field activities of the Contractors working at Site will be coordinated by the Engineer-in-Charge and his decision shall be final in resolving any disputes or conflicts between the Contractor and other Contractors regarding scheduling and co-ordination of work.

4.5.2 Engineer-in-Charge shall hold periodic meetings with the Contractors working at Site, at a time and a place to be designated by him. The Contractor shall attend such meetings and shall strictly adhere to the decisions taken during the meeting in executing his works.

4.6 Setting out the Work

4.6.1 The Engineer-in-Charge shall supply dimensioned drawings, levels and provide all necessary information to enable the Contractor to set out the works. The contractor shall make reasonable efforts to verify its accuracy before its use and the Corporation shall not be responsible for any error at a subsequent stage unless it is found that such error has crept in as a result of incorrect data furnished in writing by the Engineer-in-charge. The Contractor shall protect and preserve all reference baseline and bench marks used in setting out the works till end of the Defects Liability Period unless the Engineer-in-Charge directs their earlier removal.

4.7 Quality Compliance

4.7.1 The construction/fabrication and erection of works under the scope of this Contract shall be executed in accordance with the specifications and drawings. The Contractor shall adopt suitable quality assurance program, commensurate with NPCIL QA program.

4.8 Sufficiency of the Accepted Contract Amount

4.8.1 The Contractor shall be deemed to have satisfied himself before tendering as to the correctness and sufficiency of his tender for the works and of the rates and prices quoted in the Schedule of Quantities. The rates and prices quoted by the Contractor in the Schedule of Quantities shall, except as otherwise provided, cover all his obligations under the Contract and all matters and resources necessary for the proper execution and completion of the Works and the remedying of any defects till the end of defect liability period.

4.9 Reporting of Hindrances

4.9.1 The Contractor shall record hindrances if any, in the Hindrance register as specified in the sub clause 7.4 [Hindrances]. Hindrances recorded and accepted by the Engineer-in-charge in the register shall be the basis for granting extension of time. The hindrance register shall be in the custody of the Engineer-in-charge.

4.10 Supply of Goods

4.10.1 The Contractor shall place purchase order well in time for supply of goods as deemed necessary as per the contract. He shall arrange to give notice sufficient in advance for necessary quality assurance at the place of manufacturing. The contractor shall submit an unpriced copy of Purchase order to Engineer-in-charge in order to ensure that all the requirements of technical specifications have been met.

4.11 Transport of Goods

4.11.1 Unless otherwise stated:

- a) the Contractor shall give the Engineer-in-charge not less than 10 days notice of the date on which any Plant or a major item of other Goods will be delivered to the Site;
- b) the Contractor shall be responsible for packing, loading, transporting, receiving, unloading, storing and protecting all Goods and other things required for the

Works.

- 4.11.2 The Contractor shall indemnify and hold the Corporation harmless against and from all damages, losses and expenses (including legal fees and expenses) resulting from the transport of Goods, and pay all claims arising from their transport.

4.12 Contractor's Equipment

- 4.12.1 The Contractor shall bring only the required equipments for the execution of works and shall be responsible for all his equipments. The equipments when brought to the site shall be in working condition and deemed to be exclusively intended for the execution of this Works. The Contractor shall not remove from the Site any major items of his Equipment without the written consent of the Engineer-in-charge. List of equipments brought to site shall be submitted to the Engineer-in-charge.

4.13 Protection of the Environment

- 4.13.1 The Contractor shall take all reasonable steps to protect the environment (both on and off the Site) and to avoid damage and nuisance to any people and property resulting from pollution, noise and other consequences of his operations.
- 4.13.2 Contractor shall not at any time do, cause or permit any nuisance on site or do anything which shall cause unnecessary disturbance to owners, tenants or occupants of other properties near the site and to the general public.
- 4.13.3 The Contractor shall ensure that emissions, surface discharges and effluent from the Contractor's activities shall not exceed the values stated in the Specification, if any, or prescribed by applicable Law of the land.

4.14 Electricity

- 4.14.1 Electric power, if available (Refer Schedule A), will be provided by the Corporation at one point (the farthest distance from the work site would be 100 meters). All distribution system and metering unit should be arranged for by the Contractor himself at his own cost, complying with all relevant act/regulations. Charges for energy consumed shall be as per Schedule 'A'. For the purpose of planning, the bidder shall furnish along with his bid, the estimated requirement of electric power for execution of work in terms of maximum demand and daily energy in kWh.
- 4.14.2 Disruption in supply or non-availability of electricity shall not entitle the Contractor for any claim for compensation either in time or money. He shall make prior arrangements for such contingency to carry on with the work without interruption.
- 4.14.3 Load required can be changed twice on the request of Contractor during the currency of contract subject to prior approval by Engineer-In-Charge.
- 4.14.4 Electric power, if available can be provided to one or more places, in case in the opinion of Engineer-in-charge it is absolutely necessary and will accelerate the work.

4.15 Work during Night or on Sundays and Holidays

4.15.1 Prior written permission of the Engineer-in-Charge shall be taken whenever any works are proposed to be carried out during night or on Sundays or on authorized Holidays except when the work is unavoidable or absolutely necessary for safety of life or property of works, in which case the Contractor shall immediately inform the Engineer-in-Charge accordingly.

4.16 Material obtained from Excavation

4.16.1 Materials of any kind obtained from dismantling of a structure, excavation on the Site etc. shall remain the property of the Corporation and shall be disposed off as the Engineer-in-Charge may direct.

4.17 Treasure, Trove, Fossils, etc.

4.17.1 All fossils, coins, articles of value or antiquity, and structures and other remains or items of geological or archaeological interest found on the Site from dismantling of structure, excavation etc shall be placed under the care and authority of the Corporation. The Contractor shall take reasonable precautions to prevent Contractor's Personnel or other persons from removing or damaging any of these findings. In case where in the work or part thereof is suspended by the Corporation for protection of such articles, then the sub-clause 7.9 (Suspension of Work for a period up to 90 days) or sub-clause 7.10 (Prolonged Suspension of Work (beyond 90 days)) shall be applicable, as the case may be.

4.18 Site Drainage

4.18.1 All water which may accumulate on the Site during the progress of the works, or in trenches and excavated areas, from causes other than the Excepted Risks (as defined in the Definitions) shall be removed from the Site to the satisfaction of the Engineer-in-Charge and at cost of the Contractor.

4.19 Protection of Trees

4.19.1 Trees designated by the Engineer-in-Charge shall be protected from damage during the course of the works and earth level within 1 metre of each such tree shall not be changed. Where necessary, such trees shall be protected by providing temporary fencing. Where tree uprooting is unavoidable, procedures as directed by the Engineer-in-Charge shall be strictly complied with.

4.19.2 The Contractor shall plant and maintain trees during the currency of Contract, as specified in schedule A.

4.20 Security of the site

4.20.1 The Contractor shall provide and maintain at his own expense all lights, guards, fencing, watch and ward when and where necessary or required by the Engineer-in-Charge for protection of materials and the works or for the safety and convenience of those employed on the Works or the public.

4.20.2 The Contractor shall be responsible for keeping unauthorized persons off the site.

4.21 Co-operation and Facilities to Other Contractors

4.21.1 The Contractor shall co-operate and share the Site with other Contractors, public authorities, utilities, and with the Corporation as instructed by the

Engineer-in-charge during the currency of the contract. The Corporation may modify the schedule of work for other Contractors and shall notify the Contractor of any such modification.

- 4.21.2 The Contractor shall, in accordance with the requirements of the Engineer-in-Charge, afford all reasonable facilities to other Contractors engaged contemporaneously on separate contracts. Similarly the departmental labour and labour of any other authorized agency or statutory body which may be employed or deployed at the Site for execution of any other work may also be extended co-operation and facility by the contractor.

4.22 Training of Apprentice

- 4.22.1 The Contractor as well as his Sub-Contractor shall provide training during the currency of the Contract, to such number of Apprentices (given in Schedule A) as engaged/employed by the Corporation. The Contractor shall train them as required under The Apprentices Act, 1961. The Corporation shall make payment to apprentices as required under the Act.

4.23 Water Supply

- 4.23.1 **Water Supply:** The Contractor shall make his own arrangements for water required for the work and nothing will be paid for the same. This will be subject to the following conditions:

- (i) That the water used by the Contractor shall be sufficient for construction purposes to the satisfaction of the Engineer-in-Charge. The quality of water shall be in accordance with the specifications.
- (ii) The Engineer-in-Charge shall make alternative arrangements for supply of water at the risk and cost of the Contractor if the arrangements made by the Contractor for procurement of water are in the opinion of the Engineer-in-Charge, unsatisfactory.

- 4.23.2 **Departmental Water Supply:** Water, if available, (Refer schedule A) may be supplied to the Contractor by the Corporation subject to the following conditions:

- (i) The water charges as stipulated in Schedule A shall be recovered from the Contractor.
- (ii) The Contractor shall make his own arrangement for water connection and laying of pipelines from existing mains of source of supply and metering. The distance of the available water supply shall not be more than 100 metres from the work site.
- (iii) The Corporation do not guarantee to maintain uninterrupted supply of water and it will be incumbent on the Contractor to make alternative arrangements for water at his own cost in the event of any temporary breakdown in the Corporation's water mains so that the progress of his work is not held up for want of water. No claim of damage or refund/reimbursement of water charges will be entertained on account of such breakdown.

4.24 Land

- 4.24.1 **Land for Contractor's Office, Stores, Workshop etc.:** The Engineer-in-Charge shall,

at his discretion and for the duration of the Contract, make available at site, land for construction of Contractor's field office, workshop, stores, assembling yard, etc required for execution of the Contract. Leveling and dressing of site, any construction of temporary roads, offices, workshops, etc. as per plan approved by the Engineer-in-Charge shall be done by the Contractor at his own cost.

4.24.2 **Land for Contractor's Colony:** Land will be given, if available, (Refer schedule A) by the Corporation for the Contractor's colony. Where ever applicable the Contractor may indicate the requirement of land for the colony along with his tender. Land will be made available for the period of Contract. The Contractor shall make his own arrangement for water supply, electric supply, sanitation, access road and general cleanliness of his colony. All these amenities shall be got approved by the Engineer-in-Charge prior to construction of the camp. The Contractor shall not permit any of his personnel to maintain any living quarters within the Corporation's land other than the land allotted for colony. In case the land allotted for setting up the camp / colony is on lease, the contractor shall pay the appropriate municipal taxes / duties as applicable.

4.24.3 In respect of any land allotted to the Contractor for purposes of or in connection with the Contract, the Contractor shall be a licensee subject to the following and such other terms and conditions as may be imposed by licensor:-

- (i) that he shall pay a nominal license fee of Re.1 per hectare per year or part of a year for use and occupation, in respect of each and every separate area of land allotted to him.
- (ii) that such use or occupation shall not confer any right of tenancy of the land to the Contractor.
- (iii) that the Contractor shall be liable to vacate the land on demand by the Engineer-in-Charge.
- (iv) that the Contractor shall have no right to any construction over this land without the written permission of the Engineer-in-Charge. In case, he is allowed to construct any structure he shall have to demolish and clear the same before handing over the completed work unless agreed to the contrary.

On completion of work, the Contractor shall handover the land duly cleaned to the Engineer-in-Charge. Until and unless the Contractor has handed over the vacant possession of land allotted to him for the above purposes, the payment of his final bill shall not be made. The Contractor shall be made liable to pay at the rate of **Rs. 5,000 per week** as a penalty for the use and occupation of land beyond 6 months from the date of physical completion of work.

5 STAFF, LABOUR AND INDUSTRIAL SAFETY

5.1 Engagement of Staff and Labour

5.1.1 The Contractor shall not employ any person who has not completed eighteen years of age. He shall employ labour in sufficient numbers to maintain the required rate of progress and to complete the contract in the stipulated

completion time. He shall engage skilled and experienced workmen to the satisfaction of the Engineer-in-Charge to ensure workmanship as per the Contract.

5.1.2 The Contractor shall, unless otherwise provided in the Contract, make his own arrangements for the engagement of all staff and labour (local or other) and for their payment, housing, catering, transport etc.

5.1.3 Contractor shall employ their workmen, preferably from amongst the project affected eligible persons. Contractor, if asked by Engineer-In-Charge shall submit regularly in a prescribed performa, a list of such project affected persons employed by him throughout the contract period.

5.1.4 The contractor shall indemnify that the labour / workmen engaged by him are trained and certified for intended work.

5.2 Rates of Wages and Conditions of Labour

5.2.1 The Contractor shall pay to labour employed by him either directly or through Sub-Contractors wages in accordance with the rules, regulations and the law in force relating to the payment of wages for the workers.

5.2.2 The Contractor shall pay not less than the minimum wages declared from time to time by Central or State Government, whichever is higher.

5.2.3 The Contractor shall intimate the Engineer-in-charge well in advance the date of payment to the workers. A representative on behalf of Engineer-in-charge shall be present at the time of payment disbursement. Contractor shall obtain certificate of witness of payment by representative of Engineer-in-charge.

5.3 Persons in the Service of Corporation and other Contractors

5.3.1 The Contractor shall not recruit, or attempt to recruit, staff and labour from amongst the Corporation's Personnel without prior approval of Engineer-in-charge.

5.3.2 The Contractor shall not recruit, either on full-time or part-time basis, the staff and labour from other Contractors, working with the Corporation, without prior approval of Engineer-in-charge.

5.4 Labour Laws

5.4.1 The Contractor and his Sub-Contractors shall abide at all times by all existing labour enactment and rules, regulations, notifications, amendments and bye laws etc. issued by the State or Central Government or local administrative authorities applicable therein issued from time to time during the subsistence of contract. The Contractor shall keep the Corporation indemnified, in case any action is taken against the Corporation by the competent authority on account of contravention of any of the provisions of any Act or rules made there under, regulations or notifications including amendments.

5.4.2 In the event of the Contractor committing a default or breach of any of the provisions of the aforesaid Contractor's Labour Regulations as amended from time to time the corporation may impose penalty for each of such default as necessary. The Engineer-in-charge shall deduct such amount from bills or security deposit of the Contractor. The decision of the Engineer-in-

Charge in this respect shall be final and binding.

- 5.4.3 The employees of the Contractor and the Sub-Contractor in no case shall be treated as the employees of the Corporation at any point of time.
- 5.4.4 List of some of the Major laws applicable to establishments engaged in building and other construction work are listed below. For details, latest versions of relevant Acts and laws should be referred.
- Workmen Compensation Act, 1923
 - Payment of Gratuity Act, 1972
 - Employees P.F and Miscellaneous Provision Act, 1952:
 - Maternity Benefit Act, 1951:
 - Contract Labour (Regulation & Abolition) Act, 1970
 - Minimum Wages Act, 1948
 - Payment of Wages Act, 1936
 - Equal Remuneration Act, 1979
 - Payment of Bonus Act, 1965:
 - Industrial Disputes Act, 1947
 - Industrial Employment's (Standing Orders) Act, 1946:
 - Trade Unions Act, 1926:
 - Child Labour (Prohibition & Regulation) Act, 1986:
 - Inter-State Migrant workmen's (Regulation of Employment & Conditions of Service) Act, 1979
 - The Building and Other Construction workers (Regulation of Employment and Conditions of Service) Act, 1996 and the Cess Act, 1996
 - Factories Act, 1948
 - Employees State Insurance Act, 1948
 - Atomic Energy Factories Rules, 1996
- 5.4.5 Contractor shall at his own expense comply with or cause to be complied with Model Rules for Labour Welfare as appended to these conditions or rules framed by the Government from time to time for the protection of health and for making sanitary arrangements for workers employed directly or indirectly on the works. In case the Contractor fails to make arrangements as aforesaid, the Engineer-in-Charge shall be entitled to do so and recover the cost thereof from the Contractor.
- 5.4.6 Failure to comply with Model Rules for Labour Welfare (as annexed) and to grant of maternity benefits to female workers shall make the Contractor liable to pay to the Corporation as a penalty an amount not exceeding Rs.5000/- for each default or materially incorrect statement.
- 5.4.7 The Contractor shall be liable to pay his contribution and the employees contribution to the State Insurance Scheme in respect of all labour employed

by him for the execution of the Contract, in accordance with the provisions of "The Employees State Insurance Act, 1948" as amended from time to time. The Contractor shall submit to the Corporation the copy of monthly Challans of payments made for PF and ESI.

- 5.4.8 The Engineer-in-Charge shall have the powers to deduct any sum from the amount due to contractor for making good the loss suffered by worker(s) by reason of non-fulfillment of the conditions of contract or non-payment / short payment of wages or non-observance of the Labour laws / regulations.
- 5.4.9 In every case in which by virtue of the provisions sub-section(1) of Section 12, of the Workmen's Compensation Act, 1923, the Corporation is obliged to pay compensation to a workman employed by the Contractor, in execution of the works, the Corporation without prejudice to its right under sub-section (2) of section 12 of the said act, shall be at liberty to recover such amount or any part thereof by deducting it from the security deposit or from any sum due by the Corporation to the Contractor whether under this contract or any other contract at the same unit or any other units of the Corporation.
- 5.4.10 The decision of the Engineer-in-Charge in such matters based on reports from the Inspecting Officers as defined in the Contractor's Labour Regulation as appended to these conditions shall be final and binding and deduction(s) for recovery of such penalty may be made from any amount payable to the Contractor.

5.5 Facilities for Staff and Labour

- 5.5.1 Unless otherwise stated, the Contractor shall provide and maintain all necessary accommodation and welfare facilities for the Contractor's Personnel. Model Rules for Labour Welfare, as annexed shall be referred in this regard.

5.6 Health and Industrial Safety

- 5.6.1 The Contractor shall at all times take all reasonable precautions to maintain the health and safety of the Contractor's Personnel. The Contractor shall ensure first-aid facilities available at all times at the work site. Other facilities in collaboration with local health authorities like medical staff, sick bay, ambulance, etc. shall be provided as required. The Contractor shall also make suitable arrangements for necessary welfare and hygiene requirements and for the prevention of epidemics.
- 5.6.2 The Contractor shall comply, as statutory requirement, to all provisions of "AERB (Atomic Energy Regulatory Board) Safety Guide for Works Contract" i.e., document No. AERB/SG/IS-1 amended from time to time and other safety requirements as applicable to specific site. A copy of guide is attached herewith. In addition to the above the following requirements of Industrial safety be complied with.
- 5.6.3 The Contractor shall at his own expense arrange & provide for the safety provisions as appended to these conditions (AERB Safety Guide) and the facilities in respect of all labour directly or indirectly employed for execution of the works or as required by the Engineer-in-Charge. In case, the Contractor fails to make arrangements and provide necessary facilities as per guidelines, the Engineer-in-Charge shall be entitled to do so at the risk and cost of the

contractor and recover the cost from the Contractor with penalty as defined in Schedule (A). The total amount of penalties for non-compliance under this Para 5.6.3, shall be subject to a maximum of 2% of the contract value.

- 5.6.4 The Contractor shall provide mandatory Industrial Safety Training to all workmen. In case, where it is specified in the schedule A, the same shall be provided by the Corporation.
- 5.6.5. The Contractor shall provide and maintain all lights, fencing, guards, warning signs and caution board and similar items as required to ensure safe working conditions at work site.
- 5.6.6 The Contractor and his Sub-Contractor shall comply with the instructions given by departmental safety officer or his representative(s) regarding safety precautions, protection measures and housekeeping, etc.
- 5.6.7 The Contractor shall provide proper access and working platforms for all place of work as per laid down standards or as advised by Engineer-in-charge.
- 5.6.8 The Contractor shall ensure all floor openings in his work are guarded / barricaded during the course of work and at the end of each day's work.
- 5.6.9 All Contractors, working at plant site, must meet statutory requirements as well as regulatory requirements applicable to the plant in general and NPCIL in particular, especially the requirements as per Factory Act, Atomic Energy Factories Rule-1996 (AEFR-1996), safety guidelines for Job Hazard Analysis (JHA) & AERB notifications on Industrial & Fire safety.
- 5.6.10 All Contractors' safety professionals must be well aware about Acts, Rules, concerned with Industrial Safety and practices particularly applicable to the plant and to that effect they have to undergo an assessment at the plant within 7 days of their placement at the plant and that will be at the cost of the Contractor and then only he / she would be given permanent entry pass to plant and considered in the required strength of safety professionals.
- 5.6.11 All Personal Protection Equipments (PPE) procured and provided to workers shall conform to relevant Indian Standards and should be maintained in good condition by suitable storage, maintenance and inspection. Contractor shall promote safe work practices at work in plant.
- 5.6.12 The Contractor shall be held responsible for non-compliance of any of the safety measures, injuries, fatalities and compensation arising out of such situations or accidents.
- 5.6.13 Contractor shall be responsible for safety of all his employees during execution of the contract. As per Workmen's Compensation Act, 1923 (amended in 2000), the Contractor will ensure the payment of compensation to his employees in case of an accident as early as possible within the time frame permitted by the law of land.
- 5.6.14 The Contractor shall employ sufficient number of qualified safety professionals required for the safe execution of the job. The minimum number shall not be less than the minimum number that is specified in Schedule (A).
- 5.6.15 The Contractor should deploy safety professionals as defined above, failing which the Corporation shall outsource or deploy such person at the cost and risk

of the Contractor. Penalty, as defined in Schedule (A) shall also be recovered in addition to the cost for non-deployment of safety professionals.

5.6.16 The Contractor shall prepare industrial safety procedure for approval by corporation and ensure the industrial safety requirements have been established prior to execution of whole or part of work.

5.7 Contractor's Supervision for compliance

5.7.1 The Contractor shall provide all necessary supervision to plan, arrange, direct, manage, inspect and test the work for acceptance by Engineer-in-charge throughout the execution of the Works, and as long thereafter as is necessary to fulfill the Contractor's obligations.

5.7.2 Supervision shall be done by a sufficient number of qualified persons having adequate knowledge of the language for communications (defined in Sub-Clause 1.3 [Law and Language]) and of the operations to be carried out (including the methods and techniques required, the hazards likely to be encountered and methods of preventing accidents), for the satisfactory and safe execution of the Works.

5.8 Contractor's Personnel

5.8.1 The Contractor shall employ the key personnel as per the Schedule of Key Personnel as referred to at the time of submission of tender document to carry out or supervise the functions stated in the Schedule or other personnel approved by the Engineer-in-charge. If the Contractor himself not have sufficient knowledge and experience to be capable of receiving instructions or cannot give his full attention to the works, the Contractor shall at his own expense, employ his accredited agent as Site-in-charge approved by the Engineer-In-Charge. The Engineer-in-charge shall have full powers to suspend execution of work in case of violation of this clause and the contractor shall be held responsible for such delay.

5.8.2 The Contractor's Personnel shall be appropriately qualified, skilled and experienced in their respective trades or occupations. The Engineer-in-charge may require the Contractor to remove (or cause to be removed) any person employed on the Site or Works, including the Contractor's Representative if applicable, who:

- (a) persists in any misconduct or lack of care,
- (b) carries out duties incompetently or negligently,
- (c) fails to conform with any provisions of the Contract, or
- (d) persists in any conduct which is prejudicial to safety, health, or the protection of the environment.

The Contractor shall then appoint (or cause to be appointed) a suitable replacement person.

5.9 Records of Contractor's Personnel

5.9.1 The Contractor shall furnish to the Engineer-in-Charge, fortnightly, a distribution return of the number and description by trades of the workers employed on the works. Along with this return, the Contractor shall also submit a statement of

number of local people employed, to the Engineer-in-charge.

5.9.2 The Contractor shall also submit on the 4th and 19th of every month to the Engineer-in-charge a true statement showing in respect of the preceding fortnight,

- (i) the accidents that occurred during the said fortnight showing the circumstances under which they happened and the extent of damage and injury caused by them and
- (ii) the number of female workers who have been allowed maternity benefit as provided in the Maternity Benefit Act, 1961 or Rules made there under and the amount paid to them.

5.9.3 The Contractor shall submit the compliance report in the format appended.

5.10 Disorderly Conduct

5.10.1 The Contractor shall at all times take all reasonable precautions to prevent any unlawful, riotous or disorderly conduct by or amongst the Contractor's Personnel, and to preserve peace and protection of persons and property on and near the Site.

5.11 Foreign Personnel

5.11.1 The Contractor may depute in to the country any foreign personnel who are necessary for the execution of the Works to the extent allowed by the applicable Laws. The Contractor shall ensure that these personnel are provided with the required residence visas and work permits. The Corporation will, if requested by the Contractor, use its best endeavours with regards to issuing of necessary letters in a timely and expeditious manner to assist the Contractor in obtaining any local, state, national, or government permission required for bringing in the Contractor's personnel.

5.11.2 The foreign personnel shall have to comply with the security procedures of the corporation.

5.11.3 The Contractor shall be responsible for the return of all such staff and labour to the place from where they were recruited or to their domicile. The Contractor shall be responsible till the time they have left the country.

5.12 Other Compliance

5.12.1 The Contractor shall fulfill and comply with all the requirements, if any, notified by the government or municipal authorities or agencies so authorized in this regard, in respect of supply of foodstuff, water and to take measures against insect & pest nuisance. Failure, on the part of the Contractor shall attract penalty in addition to the action as may be initiated by the state government or municipal authorities or agencies so authorized by the Government.

The Contractor shall not do anything or permit its employees or worker deployed by him, at the site or office, which is specifically or generally prohibited by law, rules or regulations framed by the central or state government or Municipal authorities.

The rules and regulations framed by the government authorized agencies, state or central government in regards to alcoholic liquor, Arms and ammunitions and

the labor legislation shall be followed /complied in its letter & spirit, by the Contractor.

5.13 House Keeping

- 5.13.1 The contractor shall maintain the cleanliness of the work site and labour colony on a day to day basis. Failing to maintain cleanliness of work place, Engineer-in-charge will have full power to maintain the cleanliness at the risk and cost of the contractor.

6 PLANT, MATERIALS AND QUALITY ASSURANCE

6.1 Tools, Plants & Equipments

- 6.1.1 The Contractor shall arrange at his own expense all tools, plant and equipment (hereinafter referred to as T&P) required for execution of the work, except the item listed in Schedule (C) which may be given to him on hire(if the same can be spared) by the Corporation at rates shown in that Schedule. In case the Contractor require some or all items of T&P listed in Schedule (C), he shall indicate his requirements at the time of submitting his tender. The Corporation's T&P hired by the Contractor shall be transported at his expense from the place of issue to the Site and back.
- 6.1.2 If the Contractor requires any item of T&P on hire from the Corporation over and above the requirements indicated by him at the time of submitting his tender, the Corporation will, if such item is available, hire it to the Contractor at a rate to be fixed by the Engineer- in-Charge.
- 6.1.3 When T&P is hired on daily rates, the period of hire will be reckoned from the commencement of the day of issue upto the end of the day of return (including all holidays) irrespective of the actual hour of issue and return. Daily hire charges will be based on eight working hours or part thereof per day and for any additional use of T&P at rates fixed for the purpose. The Contractor will be exempted from levy of any charges for the number of days he is called upon in writing by the Engineer-in-charge to suspend execution of the work, provided the Corporation's T&P in question has, in fact remained idle with the Contractor due to suspension.
- 6.1.4 The Contractor shall be responsible for care and custody of the Corporation's T&P (including employment of security guards) during the period for which the Corporation's T&P remains with him. Any damage (fair wear and tear excepted) to any of the equipments shall be made good at the Contractor's expense to the satisfaction of the Engineer-in-Charge unless such damage is caused because of negligence of crew provided by the Corporation. The Contractor responsibility shall exclude any damage due to Excepted Risks, provided always that the Contractor has taken precautions necessary to protect it from such risks.
- 6.1.5 The Corporation's T&P hired to the Contractor shall be returned to the place of issue (unless otherwise directed by the Engineer-in-charge) on completion /termination of the work or relevant section of the work. The Corporation shall

be entitled to terminate the hire after giving 7 days notice without assigning any reason whatsoever and the Contractor shall have no claim to any payment of compensation or otherwise whatsoever on account of termination of hire of the Corporation's T&P by the Corporation.

- 6.1.6 When the T&P is hired on hourly rates, a Log Book shall be maintained by the Engineer-in-charge or any representative of the Engineer-in-Charge, for recording hours during which the items have been utilized for each day. The log book shall be daily attested by the Contractor or his authorized representative. In case the Contractor contests correctness of any entry and/or fails to sign the Log Book, the decision of the Engineer-in-Charge shall be final and binding on him. Hire charges shall be calculated in accordance with the entries in the Log Book. Hourly rate specified shall be charged for every hour or part thereof.
- 6.1.7 The hire charges (along with the taxes as applicable) payable by the Contractor shall be recovered from the Contractor's running account / final bills.
- 6.1.8 If the Corporation / other Contractors hire T&P from the Contractor, a reasonable rate as mutually agreed between the Contractor and the Engineer-in-charge shall be payable.

6.2 Workmanship

- 6.2.1 The Contractor shall execute the whole and every part of the work in the most substantial and workman like manner both as regards materials and otherwise in every respect in strict accordance with the specifications. The Contractor shall also confirm compliance to the design, drawings and instructions in writing in respect of the work to the Engineer-in-Charge for his acceptance.
- 6.2.2 The works to be carried out under the Contract shall, except as otherwise provided in these conditions, include all labour, materials, tools, plant and equipment, and transport, which may be required in execution and completion of the works. The descriptions given in the Schedule of Quantities shall, unless otherwise stated, be held to include waste on materials, carriage and cartage, carrying in return of empties, hoisting, setting, fitting and fixing in position and all other labour necessary in and for the full and entire execution and completion as aforesaid in accordance with good engineering practice and recognized principles.
- 6.2.3 In the case of any class of work for which there is no such specifications as referred to above, such work shall be carried out in accordance with Bureau of Indian Standards Specifications. In case there is no such specification in Bureau of Indian Standards, the work shall be carried out as per ASTM/ BS or manufacturers' specifications. In case there are no such specifications as referred to the above the work shall be carried out in all respects in accordance with the instructions and requirements of the Engineer-in-Charge.
- 6.2.4 The furnishing of engineering data by the Contractor shall be in accordance with the Schedule as specified in the technical specifications. The review of engineering data by the Engineer-in-charge shall not limit the Contractor towards any of his responsibilities and liabilities for mistakes and deviations, if any, from the requirements specified under these specifications and documents.

- 6.2.5 The Contractor shall carry out the manufacture of Plant, the production and manufacture of Materials, and all other execution of the Works:
- (a) in the manner (if any) specified in the Contract,
 - (b) in a proper workmanlike and careful manner, in accordance with recognized good practices, and
 - (c) with properly equipped facilities.

6.3 Quality Assurance

6.3.1 To ensure that the construction/fabrication and erection of works under the scope of this Contract whether executed within the Contractor's works or at any other place of work are in accordance with the specifications, the Contractor shall adopt suitable quality assurance program commensurate with NPCIL QA program to control such activities at all stages necessary. Such program shall be outlined by the Contractor in a QA Manual and shall be finally accepted by the Engineer-in-Charge after discussions before commencement of work. A quality assurance program of the Contractor shall generally cover but not limited to the following:

- (a) his organisation structure for the management and implementation of the proposed quality assurance program including interfaces.
- (b) documentation control system.
- (c) qualification and certification data for Contractor's key personnel.
- (d) the procedure for purchase of materials, parts, components and selection of Sub-Contractors' services including vendor selection, source inspection, incoming raw material inspection, verification of materials purchased etc.
- (e) system for construction / fabrication and site erection controls through QA plans.
- (f) Control of non-conforming items and system for corrective and preventive actions.
- (g) Inspection and test procedures both for construction and erection.
- (h) control of calibration and testing of inspection measuring and testing equipment.
- (i) system of indication and appraisal of inspection status.
- (j) system of quality audits
- (k) system of intimation by the Contractor and approval by the Engineer-in- Charge of stages of inspection.
- (l) System for maintenance of records.
- (m) System for handling, storage, preservation and delivery of items
- (n) A quality assurance plan detailing out the specific quality control procedure to be adopted for controlling the quality characteristics relevant to each item of work.

The Contractor shall deploy personnel as per QA Structure defined in special conditions of contract, failing which the Corporation shall outsource or deploy

such person at the cost and risk of the Contractor.

- 6.3.2 The Contractor shall be required to submit the relevant Quality Assurance Document within three weeks of completion of works which shall include relevant test reports connected with all engineering controls adopted by him during the construction. The Engineer-in-Charge or his duly authorized representative reserves the right to carry out Quality Audit and Quality Surveillance of the systems and procedures of the Quality Management and Control Activities of the Contractor / his vendor.
- 6.3.3 The QA Manager appointed by the Contractor shall report administratively to Project Manager but functionally (on technical matters) to the Head Quarters of the Contractor's Company. QA staff shall be responsible only for quality control and they should not be deployed for execution of the work.

6.4 Materials & Samples

- 6.4.1 The Contractor shall, at his own expense, provide all materials required for the works, other than the material which are to be issued by the Corporation.
- 6.4.2 The Contractor shall, at his own expense and without delay, supply to the Engineer-in-Charge samples in accordance with QA program of materials proposed to be used in the works. The Engineer-in-Charge shall, within 7days of supply of samples or within such further period as he may require, intimate to the Contractor in writing, whether samples are approved by him or not. If samples are not approved, the Contractor shall forthwith arrange to supply to the Engineer-in-Charge for his approval fresh samples complying with the specifications laid down in the Contract at his cost.

6.5 Inspection

- 6.5.1 The Corporation's Personnel shall at all reasonable times:
- a) have full access to all parts of the Site and to all places from which natural Materials are being obtained, and
 - b) during production, manufacture and construction (at the Site and elsewhere), be entitled to examine, inspect, measure and test the materials and workmanship, and to check the progress of manufacture of Plant and production and manufacture of Materials.
- 6.5.2 The Contractor shall give the Corporation's Personnel full opportunity to carry out these activities, including providing access, facilities, permissions and safety equipment along with required manpower. No such activity shall relieve the Contractor from any obligation or responsibility.
- 6.5.3 The Contractor shall give notice to the Engineer-in-charge whenever any work is ready and before it is covered up, put out of sight, or packaged for storage or transport. The Engineer-in-charge shall then either carry out the examination, inspection, measurement or testing without unreasonable delay, or promptly give notice to the Contractor that the Engineer-in-charge does not require to do so. If the Contractor fails to give the notice, he shall, if and when required by the Engineer-in-charge uncover the work and thereafter reinstate and make good, all at the Contractor's cost.

6.6 Testing

- 6.6.1 This Sub-Clause shall apply to all tests specified in the Contract.
- 6.6.2 Except as otherwise specified in the Contract, the Contractor shall provide all apparatus, assistance, documents and other information, electricity, equipment, fuel, consumables, instruments, labour, materials, and suitably qualified and experienced staff, as are necessary to carry out the specified tests efficiently. The Contractor shall agree, with the Engineer-in-charge the time and place for the specified testing of any Plant, Materials and other parts of the Works.
- 6.6.3 The Engineer-in-charge shall give the Contractor not less than 24 hours' notice of the Engineer's intention to attend the tests. If the Engineer-in-charge does not attend at the time and place agreed, the Contractor may proceed with the tests, unless otherwise instructed by the Engineer-in-charge.
- 6.6.4 If the Engineer-in-charge requires this Plant, Materials or workmanship to be retested, in case of any doubt, the tests shall be repeated under the same terms and conditions. The cost of such additional tests shall be mutually agreed upon.

6.7 Rejection

- 6.7.1 The Engineer-in-Charge shall have full powers to instruct the removal of any or all of the materials brought to Site by the Contractor which are not in accordance with the Contract specifications or do not conform in character or quality to samples approved by him. In case of default on the part of the Contractor in removing rejected materials, the Engineer-in-Charge shall be at liberty to have them removed by other means. The Engineer-in-Charge shall have full powers to procure other proper materials to be substituted for rejected materials, in the event of the Contractor refusing to comply. All costs, which may accrue upon such removal and/or substitution, shall be borne by the Contractor. The decision of Engineer-in-charge shall be final and binding.

6.8 Remedial Work

- 6.8.1 The Engineer-in-charge may instruct the Contractor to:
- (a) remove from the Site and replace any Plant or Materials which is not in accordance with the Contract,
 - (b) remove and re-execute any other work which is not in accordance with the Contract, and
 - (c) execute any work which is urgently required for the safety of the Works, whether because of an accident, unforeseeable event or otherwise.
- 6.8.2 The Contractor shall comply with the instruction within a reasonable time, or immediately if urgency is specified under sub-paragraph (c) above.
- 6.8.3 If the Contractor fails to comply with the instruction, the Corporation shall be entitled to employ and pay other persons to carry out the work at the risk and cost of the Contractor.

6.9 Ownership of Plant and Materials

- 6.9.1 Except otherwise specified in the Contract, each item of Plant and Materials shall, to the extent consistent with the Laws of the Country, become the property

of the Corporation at whichever is the earlier of the following times, free from liens and other encumbrances:

- (a) when it is incorporated in the Works;
- (b) when the Contractor is paid the corresponding value of the Plant and Materials.
- (c) when the secured advance is paid for materials received.

6.9.2 Material issued by the Corporation to the Contractor for incorporating in the work either free of cost or chargeable basis shall remain the property of Corporation.

6.10 Octroi, Cess, Taxes, Royalties, etc.

6.10.1 All charges on account of octroi, cess, VAT, service tax, royalty, terminal or Sales Tax and other duties on materials obtained for the works from any source (excluding materials supplied by the Corporation) shall be borne by the Contractor.

6.10.2 In pursuant to or under any law, notification or order any royalty, cess or the like becomes payable by the Corporation in respect of any material used by the Contractor in the works then in such a case, the Corporation shall be entitled to recover the amount paid in the circumstances as aforesaid from dues of the Contractor.

6.10.3 Any increase in rate of or new statutory levies, customs duty, VAT, service tax, octroi and other duties during the currency of the contract shall be reimbursed by the Corporation on submission of documentary proof for payments.

6.11 Urgent Works

6.11.1 If, by reason of an emergency arising in connection with and during the execution of the Contract, any protective or remedial work is necessary as a matter of urgency to prevent damage to the Works, the Contractor shall immediately carry out such work.

6.11.2 If the Contractor is unable or unwilling to do such work immediately, the Corporation may do or cause such work to be done as the Corporation may determine is necessary in order to prevent damage to the Works.

6.11.3 If the work done by the Corporation was to be executed by the Contractor under the Contract, the reasonable costs incurred by the Corporation in connection therewith shall be paid by the Contractor to the Corporation.

6.12 Materials Issued by the Corporation

6.12.1 Materials to be supplied by the Corporation are shown in Schedule B which also stipulates quantum, place of issue and rate(s) to be charged in respect thereof. The Corporation shall, at its risk and cost, provide these materials at the time and place specified in the Contract. The Contractor shall then visually inspect them, and shall promptly give notice to the Engineer-in-charge of any shortage, defect or default in these materials. Unless otherwise agreed by both Parties, the Corporation shall immediately rectify the notified shortage, defect or default.

6.12.2 The Contractor shall bear the cost of loading, transporting to Site, unloading,

storing under cover as required, assembling and joining the several parts together as necessary and incorporating or fixing materials in the works including all preparatory work of whatever description as may be required.

6.13 Material Accounting

- 6.13.1 The contractor shall account for all materials issued as free / chargeable by the Corporation. He shall also maintain account for the materials suggested by the Engineer-in-charge and procured by him. The material account must be submitted as and when required by the engineer-in-charge and on completion of the contract. Retention money shall be released only after completion of material accounting.
- 6.13.2 The actual consumption of quantity of materials shall be calculated based on the measurements with reference to the standard formula /Bureau of Indian Standards/approved cutting plan as applicable on the basis of drawings and specifications. The permissible returnable wastage and invisible wastage shall be as per schedule 'B'.
- 6.13.3 In case of supply and erection package, the details of returnable wastage / quantities shall be discussed during pre bid meetings for all the items involved.
- 6.13.4 The contractor shall prepare and submit reconciliation statement indicating the quantities of material issued to him and/or procured by him and the quantities of material consumed as per design and drawings including permissible wastage to the satisfaction of the Engineer-in-charge within 15 days of the issue of written notice by him.
- 6.13.5 The contractor shall be liable to be charged penalty in addition to the cost of material at market rate landing at NPCIL stores incase he fails to submit the reconciliation statement and/or deposit the excess material issued to him over the theoretical consumption including the permissible wastage back to the NPCIL stores.

6.14 Mega Power Project Concessions

- 6.14.1 The Contractor shall include all concessions in taxes and duties available under Mega Power Project, if applicable as per NIT. The Corporation's responsibility will be limited to the extent of issuing necessary certificates. Contractor shall arrange all the other requisites for availing the benefits under the Mega Power Project at no extra cost to the Corporation.

7 COMMENCEMENT, DELAYS AND SUSPENSION

7.1 Commencement of Work and completion time

- 7.1.1 The execution of the works shall commence from the date of commencement as mentioned in the work order and the completion period for the work shall also be reckoned from the said date. The time allowed for execution of the works or the extended time in accordance with these conditions shall be the **essence of**

the Contract.

- 7.1.2 If the Contractor commits default in commencing the execution of the work as aforesaid; the Corporation shall without prejudice to any other right or remedy be at liberty to forfeit the Bid security absolutely.

7.2 Program

- 7.2.1 The Contractor shall submit a detailed resource based time program for physical & financial progress of the Works to the Engineer-in-charge for his approval, within 30 days after Commencement of Works as defined in sub-clause 7.1. The Contractor shall also submit a revised program whenever the previous program is inconsistent with actual progress or with the Contractor's obligations.
- 7.2.2 Each program shall include:
- (a) the order in which the Contractor intends to carry out the Works, including the anticipated timing of each stage or activity or milestone of design, submission of Contractor's Documents, procurement, manufacture of Plant, delivery to Site, construction, erection and testing including resource mobilization details,
 - (b) Sub-Contractor wise detailed breakup of the above stages of work,
 - (c) the sequence and timing of inspections and tests specified in the Contract, and
 - (d) a supporting report which includes:
 - (i) a general description of the working methodology which the Contractor intends to adopt for the major stages / activities, in the execution of the Works, and
 - (ii) Contractor's resource mobilization details stating reasonable estimate of the number of each class of Contractor's Personnel and of each type of Contractor's Equipment, required on the Site for each major stage/ activity.
- 7.2.3 The program shall define as mentioned above, intermediate milestones which will form the basis for, monitoring the progress and initiating such corrective measures as may be decided by the Engineer-in-charge which shall be final and binding.
- 7.2.4 Within 15 days of receipt of the program, the Engineer-in-charge shall give notice to the Contractor, stating the extent to which the program does not comply with the Contract. In absence of the same, the Contractor shall proceed in accordance with the program, subject to his other obligations under the Contract.
- 7.2.5 The Corporation's Personnel shall be entitled to rely upon such program when planning their activities.
- 7.2.6 If, at any time, the Engineer-in-charge gives notice to the Contractor that a program fails to comply with the Contract or to be consistent with actual progress and the Contractor's stated intentions, the Contractor shall submit a revised program to the Engineer without any further delay.
- 7.2.7 It is expected that e-governance will be largely adopted for submission of programs / reports during execution of work.

7.3 Early Detection of Hindrances

- 7.3.1 The Contractor shall intimate the Engineer-in-charge at the earliest opportunity, of specific likely future events or circumstances that may adversely affect the quality of the work, increase the Contract Price or delay the execution of works. The Engineer-in-charge may require the Contractor to provide an estimate of the expected effect of the event or circumstance on the Contract Price and Completion Date. The estimate is to be provided by the Contractor as soon as reasonably possible.
- 7.3.2 The information provided by the Contractor can be used by the Engineer-in-Charge for considering his proposals to overcome the eventualities or reduce the effect on execution and completion of work as per contract conditions.

7.4 Hindrances

- 7.4.1 The Contractor is required to record the hindrance if any, while carrying out the construction work as well as executing the work in respect of design, engineering, procurement and supply related issues, in the hindrance register maintained by the Engineer-in-charge. The Contractor shall record hindrances in the Hindrance Register(s) and get it approved/ endorsed by the Engineer-in-Charge, as the case may be.
- 7.4.2 Hindrances recorded in the register shall form the basis for granting extension of time. The format of the hindrance register is **annexed**.

7.5 Rate of Progress

- 7.5.1 The Contractor shall submit a report on rate of progress of work at the desired frequency, as requested by engineer-in charge.

If, at any time Engineer-in-charge notices that the:

- (a) actual progress is too slow to complete within the Time for Completion, and/or
- (b) progress has fallen or will fall behind the current program under Sub-Clause 7.2

then the Engineer-in-charge may instruct the Contractor to submit the revised program, as envisaged in Sub-Clause 7.2, along with supporting report describing the revised methods which the Contractor proposes to adopt in order to expedite progress and complete the interim milestones as per the given schedule as well as complete the whole work within the time stipulated in the contract.

- 7.5.2 Unless the Engineer-in-charge notifies otherwise, the Contractor shall adopt these revised methods, which may require increases in the working hours and/or in the numbers of Contractor's Personnel and/or Goods, at the risk and cost of the Contractor.

7.6 Extension of Time for Completion

- 7.6.1 Request for extension of time, has to be made by the Contractor in writing within 15 days of the occurrence of the event causing delay. The Contractor shall indicate the period for which extension is desired, in such request.

- 7.6.2 All such events or requests shall be considered and analysed by the Engineer-in-charge within 30 days before completion period of the contract and the decision regarding the extension of time is to be communicated to the Contractor before completion date.
- 7.6.3 The absence of any request or application from the Contractor for extension of time shall not be a bar for giving a fair and reasonable extension by the Engineer-in-charge and this shall be binding on the Contractor.

7.7 Compensation for delay

- 7.7.1 Compensation for delay shall be levied in the contracts where the estimated cost put to tender is above Rs. 5 Lakhs.
- 7.7.2 If the Contractor fails to maintain the required progress or to complete the work and clear the site on or before the Contract or agreed extended date of completion, the Contractor shall, without prejudice to any other right or remedy of the Corporation on account of such breach, pay as agreed compensation amount calculated as stipulated below or such smaller amount as be fixed by the Corporation on the Contract Value of the work for every week that the progress remains below that specified in contract document or that the work remains incomplete.
- 7.7.3 These delay damages shall be the amount calculated by the Corporation on the Contract Value of the work for every week that the progress remains below that specified in contract document or that the work remains incomplete.
- 7.7.4 The term 'Contract Value' shall be the value at contract rates of the work as ordered. This shall exclude the value of the part of works which has been taken over and put in use by the Corporation.
- 7.7.5 The delay damages would be as follow:-
- (a) Completion period (originally stipulated) not exceeding 1 year - 1% of Contract Value per week.
 - (b) Completion period (originally stipulated) exceeding 1 year and not exceeding 3 years -1/2% of the Contract Value per week.
 - (c) Completion period (originally stipulated) exceeding 3 years – 1/4% of Contract Value per week.
- 7.7.6 However, the total amount due under this Sub-Clause shall not exceed 5% of the total value of the Contract value or of the Contract Value of the item or group of items of work for which a separate period of completion is specified.
- 7.7.7 These delay damages shall be the only damages due from the Contractor for such default, other than in the event of termination under Clause 13 [Contract Termination by Corporation] prior to completion of the Works. These damages shall not relieve the Contractor from his obligation to complete the Works, or from any other duties, obligations or responsibilities which he may have under the Contract.
- 7.7.8 The amount of compensation shall be adjusted or set off against any sum

payable to the Contractor under this or any other contract(s) with same unit or any other unit(s) of the Corporation.

7.8 Incentives

7.8.1 The time allowed for execution of the works as specified in the work order is the essence of the contract. However if the work is required to be completed in compressed period before the stipulated date of completion then the contractor may be eligible for the incentive. Refer Schedule A for applicability of the Incentive clause. This clause shall be operated only with prior approval of CMD, NPCIL.

7.8.2 For early completion of the contract work before the stipulated date of completion, an incentive amount / percentage which shall be decided by the Engineer-in-charge will be paid. If the incentive is to be apportioned between the various milestones to complete the work the same shall be decided by the Engineer-in-charge while drawing the construction schedule. The incentive amount shall be subject to a maximum percentage (as specified in Schedule A) of the contract value.

For this purpose the term 'Contract Value' shall be the value at contract rates of the work as agreed upon in the contract.

7.9 Suspension of work for period upto 90 days

7.9.1 The Engineer-in-charge may at any time instruct the Contractor to suspend progress of part or all of the Works. During such suspension, the Contractor shall protect, store and secure such part or all of the Works against any deterioration, loss or damage. No compensation shall be paid for suspension upto the period of 30 days.

7.9.2 The Contractor shall, on receipt of the order in writing of the Engineer-in-Charge, suspend the progress of the works or any part thereof for such time and in such manner as the Engineer-in-Charge may consider necessary for any of the following reasons:

- (i) on account of any default of the Contractor, or
- (ii) for proper execution of the Works or part thereof for reasons other than the default of the Contractor;

7.9.3 If the suspension is ordered for reasons (ii) above ,

- (i) Contractor shall be entitled to an extension of the time equal to the period of each such suspension plus 25% for completion of the item or group of items of work for which a separate period of completion is specified in the contract and of which the suspended work forms a part, and;
- (ii) if the total cumulative period of all such suspension exceeds 30 days, the Contractor shall, in addition, be entitled to compensation for the period of suspension beyond 30 days, as mentioned in the Schedule A.

However the Contractor shall submit within 10 days his claim to the Engineer-in-Charge for every 15 days of suspension, over and above 30 days.

7.10 Prolonged Suspension of work (beyond 90 days)

- 7.10.1 If the works or part thereof is suspended on the orders of the Engineer-in-Charge for more than 90 days at a time, except when suspension is ordered for reason 7.9.2 (i) above, the Contractor may after receipt of such order serve a written notice to the Engineer-in-Charge requiring permission from him, to treat the suspension, where it affects only a part of the works as deletion of such part and if the same is accepted by Engineer-in-charge then it will be dealt under Clause 11[Variations and Adjustments] and no compensation on account of suspension shall be paid.
- 7.10.2 Where the suspension affects the whole of the Works or part thereof and the suspension of the part of the work is not treated as deletion as above, then the Contractor may serve a notice to Engineer-in-charge requiring permission within 10 days from the date of receipt of said notice by Engineer-in-charge to demobilize the labour/staff and remove plant and equipment or any part thereof.
- 7.10.3 In case Engineer-in-charge agrees to the Contractor's request then the Contractor shall be at liberty to demobilize the labour/staff and remove plant and equipment or any part thereof hypothecated to the Corporation under this contract to any other works site of the Contractor for carrying on his other works, after giving an undertaking through an indemnity bond to bring back to the Site the labour /staff and plant and equipment as may be necessary for completion of the works, immediately after the suspension is revoked. If such plant and equipment are not brought back, the Contractor shall forthwith repay the amount of the loan outstanding with interest. The security deposit from the contractor may also be forfeited.
- 7.10.4 In case the Engineer-in-charge does not agree to the contractor's request to demobilize, the contractor shall be continued to be paid the compensation as per sub-clause 7.9.3 (ii) provided the Contractor submits his claim in accordance to the clause supported by details to the Engineer-in-Charge.
- 7.10.5 In addition to above compensation the Contractor shall be entitled to an extension of the time equal to the period of such suspension plus 25% for completion of the item or group of items of work for which a separate period of completion is specified in the contract and of which the suspended work forms a part.

7.11 Payment for Plant and Materials in Event of Suspension

- 7.11.1 The Contractor shall be entitled to payment of the value of Plant and/or Materials, meant to be incorporated in works which have not been delivered to Site, if:
- (a) the work on Plant or delivery of Plant and/or Materials has been suspended for more than the 30 days except when suspension is ordered for reason 7.9.2 (i) above and
 - (b) the Contractor has marked the Plant and/or Materials as the Corporation's property in accordance with the Engineer's instructions.
- Under the above situation Corporation shall make payment to the Contractor

on production of documentary evidence to the effect that he has marked / purchased these items for Corporation and make him responsible to deliver these items to Corporation either during suspension or after revoking suspension.

7.12 Resumption of Work

7.12.1 After the permission or instruction to proceed with the work is given, the Contractor and the Engineer-in-charge shall jointly examine the Works and the Plant and Materials affected by the suspension. The Contractor shall make good any deterioration or defect in or loss of the Works or Plant or Materials, which has occurred during the suspension after receiving from the Engineer-in-charge an instruction to this effect.

8 CORPORATION'S TAKING OVER

8.1 Completion Certificate

8.1.1. The Contractor shall as soon as the work is complete in all respects give notice to the Engineer-in-charge for his acceptance. The Engineer shall, within 30 days after receiving the Contractor's application:

- i) shall inspect the work and shall furnish the Contractor with a certificate of completion indicating
 - (a) date of completion
 - (b) defects to be rectified by the Contractor and/ or
 - (c) items for which payment shall be made at reduced rates.

When separate periods of completion have been specified for items or groups of items, the Engineer-in-Charge shall issue separate completion certificates for such item or groups of items.

- ii) reject the application, giving reasons and specifying the work required to be done by the Contractor to enable to Completion Certificate to be issued. The Contractor shall then complete this work before issuing a further notice under this Sub-Clause.

8.1.2 The contractor shall remove all the temporary material/equipment and clear the work place as per the directives of Engineer-in-charge. Contractor shall also ensure that all permanent structure has been adequately cleaned for use by others, failing which the Engineer-in-charge will have sufficient reasons to make the place good to use at the risk and cost of the contractor.

9 DEFECTS LIABILITY

9.1 Rectification of Defects

9.1.1 The defect liability period shall commence from the date of completion as certified by the Engineer-in-charge. The Contractor shall be responsible to make good and rectify at his own expense within such period as may be

stipulated by the Engineer-in-Charge in his communication to Contractor, any defect which may develop or may be noticed before the expiry of the defect liability period as mentioned in Schedule (A).

- 9.1.2 The Contractor shall on receiving the intimation shall execute all work required to rectify defects or damage, as may be notified by the Corporation on or before the expiry date of the Defects Liability Period for the Works.
- 9.1.3 If the Contractor fails to carry out the aforesaid work within the period fixed by the Engineer-in-charge after serving the notice to the Contractor, all work referred to in this Sub-Clause shall be executed at the risk and cost of the Contractor.
- 9.1.4 The Corporation shall be entitled to an extension of the Defects Liability Period for the Works or a section of work for a period equal to the period during which the Works or section of work cannot be used by the Corporation due to reasons of a defect or by reason of a damage attributable to the Contractor.
- 9.1.5 Any rectification of defect which is not attributable to the Contractor but requested by the Engineer-in-charge for doing so, shall be carried out by the Contractor at the cost of Corporation on a mutually agreed basis.
- 9.1.6 Unless otherwise specified in the contract, at the end of Defect Liability period the contractors liability ceases except for Latent Defects, if applicable as per Schedule "A". The latent defect for this purpose shall mean any defects which exists but has not surfaced at the time of testing and has not manifested during defect liability period. The Contractors liability for Latent Defects warranty for the plant and equipment including spares shall be limited to a period of 5 (five) years from the end of Defect Liability period of the respective plant and equipment including spares. A written communication in this regards shall be submitted by the contractor.

10 MEASUREMENT AND EVALUATION

10.1 Records & Measurement

- 10.1.1 Engineer-in-Charge shall, except as otherwise stated, ascertain and determine by measurement the value of work done in accordance with the Contract.
- 10.1.2 All items having a financial value shall be entered in Measurement Book, Field Book etc. prescribed by the Corporation so that a complete record is obtained of all work executed under the Contract. However, where the computerized system is used for billing by the Corporation, all above records will be maintained in the computer system (WCMS) and a hard copy generated will be kept as a record after the acceptance by the Contractor.
- 10.1.3 Measurement shall be taken jointly by the Engineer-in-Charge or his authorized representative and by the Contractor or his authorized representative from time to time.

- 10.1.4 Whenever the Engineer-in-charge requires any part of the Works to be measured, reasonable notice shall be given to the Contractor's Representative, who shall:
- (a) promptly assist the Engineer-in-charge in making the measurement along with a qualified official, and
 - (b) supply any particulars requested by the Engineer-in-charge
- 10.1.5 The Contractor shall without extra charge, provide all assistance such as appliance, labour and other things necessary for measurements.
- 10.1.6 Measurements shall be signed and dated by both the parties from time to time on the Site during the progress of the Work.
- 10.1.7 If the Contractor objects to any of the measurements recorded on behalf of the Corporation, a notice to that effect shall be made with reasons and submitted to Engineer-in-charge for decision in this regard. After receiving this notice, the Engineer-in-charge shall review the records and either confirm or vary them and certify the payment of the undisputed part. The decision of Engineer-in-Charge on such dispute or difference or interpretation shall be final and binding on both the parties.
- 10.1.8 If the Contractor fails to attend or send his authorized representative for measurement after such a notice or fails to counter-sign or to record his objections within a week from the date of measurement, then measurements taken by the Engineer-in-Charge or by his authorized representative shall be taken to be the correct measurement of the work.
- 10.1.9 When the contract includes lump-sums in respect of parts of the work, the Contractor shall be entitled for payment in respect of such items of work involved or the part of the work in question, at the same lumpsum price as are payable under this contract for such items.
- 10.1.10 If in the opinion of the Engineer-in-Charge, part of the work in question is not payable by measurements, the Engineer-in-Charge may pay the amount commensurate to the value of work done based on lumpsum amount quoted. In such a case, the Engineer-in-Charge would provide a certificate which shall be final and conclusive against the Contractor with regard to any sum or sums payable to him under the provisions of the clause.
- 10.1.11 Recording of measurements will not relieve the Contractor of his responsibilities and liabilities over any recorded excess measurements or noticed defects till the completion of the defect liability period.

10.2 Method of Measurement

- 10.2.1 Except where any general or detailed description of the work in quantities expressly shows to the contrary, schedule of quantities shall be deemed to have been prepared and measurements taken in accordance with the procedure set forth in Schedule of Rates /Specification, notwithstanding any provision in the relevant Standard Method of Measurement or any general or local custom.

10.2.2 In the case of items which are not covered by the Schedule of Rates / Specification, measurement shall be taken in accordance with the relevant Standard Method of Measurement issued by the Bureau of Indian Standards and if for any item no such standard is available, then a mutually agreed method shall be followed.

11 VARIATIONS AND ADJUSTMENTS

11.1 Right to Vary

11.1.1 Variations may be initiated by the Engineer-in-charge at any time prior to issuing the Completion Certificate for the Works, by an instruction for the Contractor to submit a proposal. The Contractor shall submit a proposal for variation for approval of Engineer-in-charge.

11.1.2 Each Variation may include:

- a) changes to the quantities of any item of work included in the Contract,
- b) changes to the quality and other characteristics of any item of work,
- c) deletion of any work which forms part of the scope given in the contract, or
- d) any additional work, Plant, Materials or services necessary for the Works, including any associated Tests on Completion and exploratory work.

11.1.3 The time for completion of the works shall, in the event of variations resulting in additional cost over the Contract value being ordered be extended as follows, if requested by the Contractor:

- (a) in the proportion which the additional cost of the extra, additional or substituted work, bears to the original Contract Sum; plus
- (b) 25% of the time calculated in (a) above or such further additional time as may be considered reasonable by the Engineer-in-Charge.

11.2 Payment for Variations

11.2.1 Variation permitted beyond the tendered quantity for individual items shall be as follows,

- | | | |
|--------------------|---|-------|
| • Excavation items | : | ±100% |
| • All other items | : | ±50% |

11.2.2 Any variation above the tendered quantity but within the above specified limit shall be paid as per the rates as provided in the contract in the Schedule of quantities.

11.2.3 In case the quantities to be executed is beyond the variation limits above or extra, additional or substituted work, the contractor shall give notice to the corporation of his intention to claim a varied rate or price supported by proper analysis within 14 days of the date of instruction for executing varied work, extra,

additional work or substituted work, and before the commencement of such work.

- 11.2.4 In case of quantities beyond variation limits, the Engineer-in-charge shall determine the rates, after due consideration to the rate analysis submitted by the contractor. These provisions shall also be applicable for decrease in rates.
- 11.2.5 For determining the rates for extra, altered or substituted item, where in such item with similar specification is available in the schedule of quantities then the same rate shall be applied. In case the item is not available within the same schedule of quantities but are available in other parts / modules of the contract, then the lowest rate among the rates in other part / module shall be considered.
- 11.2.6 In case the rates for extra, altered or substituted item are not available in any part or Module of Schedule of quantities then the rate shall be determined based on Market rates, approved by the Engineer-in-charge.
- 11.2.7 Deletion of any item / any part of work of schedule of quantities shall also form part of the variation limit.
- 11.2.8 If the over all net contract value is less than 75% of the contract value, then a suitable compensation shall be assessed mutually and paid to the contractor based on case to case basis.
- 11.2.9 In case the quoted rates are more than 25% of the estimated departmental rates the corporation has got a right to negotiate such rates with prospective bidder for execution of quantity beyond the tendered quantity before award of work.

11.3 Contract Price Adjustment

- 11.3.1 The rates quoted by the tenderer shall be the Base Price, which will be subjected to PRICE ADJUSTMENTS in accordance with the conditions and formula prescribed herein and further subject to satisfying the requirements specified in this clause only. This clause is applicable only to the contracts where stipulated completion period is more than 12 months.
- 11.3.2 For contract(s) where completion period as stipulated in NIT or work order is less than and upto 12 (twelve) months and where there is a delay which is attributed to the Corporation, due to which the period of the contract exceeds 12 months, the contract price adjustments is applicable for the extended period. (For example, where the original contract period is 10 months and there is extension for 3 months, then adjustment is payable for one month i.e. 13th month only). However the Subscript value of "0" defined in 11.3.4 above shall be the indices of the month in which the Mid period (50% in terms of days) of the extended contract period falls on.
- 11.3.3 The "Contract Price" as awarded shall be the Base Price, unless other wise specified.

A certain fixed percentage of the base price shall not be subject to any price adjustment. The balance percentage to be specified shall be of Identified Components towards Labour, Material(s) (not being material supplied/or services rendered at fixed prices by the Corporation) and P.O.L. and shall be subjected to Price Adjustment. The fixed component shall be 15% of the

contract value, and is not subjected to price adjustments. However other components shall vary from contract to contract depending upon the scope of work(s) and this information is furnished by the Corporation in Schedule A(refer clause 11.3.4).

11.3.4 The actual amount of price adjustment shall be determined by satisfying the conditions specified herein.

The price adjustment formula for the various components of the Contract Price shall be construed as stipulated hereinafter. The formula designed for governing and calculating the price adjustment to be applied to the contract price shall be as follows:

$$ACV_1 = CV (F + I_u \times L_{u1}/L_{u0} + I_s \times L_{s1}/L_{s0} + m \times M_1/M_0 + n \times N_1/N_0 + o \times O_1/O_0 + p \times P_1/P_0 + q \times Q_1/Q_0 + d \times D_1/D_0)$$

Where:

- ACV1 - Adjusted contract price i.e., value of work done after application of above price adjustment formula.
- CV Base contract price, subject to price adjustment, i.e. the value of the work done in the given period for which the Price Adjustment is to be calculated excluding cost of material supplied or services rendered at fixed prices by the Corporation and the cost of extra items, rates for which have been worked out based on market rates.
- F Fixed component i.e. 15% of contract value, which is not subjected to any adjustment under this formula or otherwise.
- I_u - Unskilled Labour component (Defined in Schedule A) expressed as percentage of the contract value which will be subjected to adjustment.
- I_s - Skilled labour component (Defined in Schedule A) expressed as percentage of the contract value which will be subject to adjustment.
- m,n,o,p - Various material component (bought by the contractor) expressed as percentage of the contract value(defined in Schedule A), which will be subject to adjustment. The sum of m,n,o,p along with F, d , labour (I_u and I_s) and q should sum up to one.
- 'q - Component for all the other materials (other than m, n, o, and p) expressed as percentage of contract value, as defined in Schedule A.
- d - P. O. L. component expressed as percentage of the contract value, as defined in Schedule A, which will be subject to adjustment.
- M, N, O, P - Corresponding published price indices of various materials based on All India Wholesale Price Index for Individual Commodities /Group Items for the period under consideration published by Economic advisor to Government of India, Ministry of Industry & Commerce.
- Q - Wholesale price indices applicable to all commodities for the period under consideration as published by Economic Advisor to Government of India, Ministry of Industry & Commerce.

- L - Minimum wages in Rupees of a labour fixed under any law, statutory rule or order as applicable on the last date of the month under consideration (where in subscript 'u' and 's' denotes the unskilled and skilled labour respectively).
- D - Petrol prices of the nearest petrol pump (defined in Schedule A) applicable as on the last date of the month under consideration.

SUBSCRIPT:

- '0' - refers to the values of the above-mentioned Minimum Wages/ Material indices/ Petrol price applicable to previous month prior to the date of submission of tenders (In case of two part tender the date of submission of Part 1 shall be taken).
- '1' - refers to the values of corresponding Minimum Wages, Material indices/ petrol price as applicable for the month prior to the month in which the work is executed for which adjustment is applicable, respectively.
- 11.3.5 The value of fixed component 'F' will remain unchanged and fixed and shall not be disputed.
- 11.3.6 Price Adjustment(s) shall be calculated for the quantum of works executed during the month of the bill.
- 11.3.7 Additional, altered or substituted items of work, derived from the agreed Bill of quantities and rates attached in work order will also attract price adjustment as per this clause. No price adjustment for the cost of material issued and/or services provided by the Corporation shall be applicable, which are issued at fixed rates to the Contractor. Extra, altered or substituted item for which the rate has been derived from the market rate, shall not be subject to price adjustment within 12 months from the actual commencement of execution or date of its communication to the contractor whichever is earlier.
- 11.3.8 In the case of materials brought to site for which any secured advance is included in the bill, the full assessed value of such advance shall be added to the cost of work shown in the bill for operation of this Clause. Similarly, when such materials are incorporated in the work and secured advance is deducted from the bill, the full assessed value should be deducted from the cost of the work shown in the bill, running or final.
- 11.3.9 In case of advance payment is given for the work done but not measured the full value of such unmeasured work shall be added to the cost of work shown in the bill for operation of this Clause. When such work is measured and paid the full value of such work shall be deducted from the cost of work shown in the bill, running or final.
- 11.3.10 Every month after the award of Contract, the Contractor shall submit to the Engineer-in-Charge, a written notice of the changes, if any, that have occurred in the specified indices of Material/petrol prices and in minimum wages for labour during the previous month containing the effective date of such change, the extent of change etc. with authenticated documentary evidence (as described above) of the relevant published indices/petrol price/minimum wages to substantiate the price adjustment claim.

- 11.3.11 Provided further that such payment/refund shall not be operative and payable after the Schedule expiry of the contract period including authorized extended contract period.
- 11.3.12 In case where the reasons for extension of the contract is attributable to the force majeure and Contractor, the Contractor shall be paid the contract price adjustment for the extended period at the frozen indices applicable for the month preceding to the last date of stipulated completion period or extended completion period attributable to Corporation whichever is later. In case the prevailing price indices are lower than the frozen indices, as stated above, the lower shall be considered.
- 11.3.13 For this purpose, the total delayed period shall be apportioned between delays due to the Corporation, force majeure events and / or the Contractor in the following order:
1. Delay caused by the Corporation will be allowed considering as if this delay due to the Corporation happened first, immediately after stipulated contract completion period, irrespective of actual point in time in which such delay by Corporation occurs.
 2. Followed by delay due to Force Majeure,
 3. Delay due to Contractor
- 11.3.14 The total adjusted contract price shall be:
- (Sigma) ACV1 + Other elements of Contract Price, if any
- 11.3.15 Except as provided herein, no other expenditure incurred by the Contractor, under any Clause(s) / item(s) due to any reason whatsoever, shall be payable to the Contractor.
- 11.3.16 Bids specifying provisions other than those specified above run the risk of rejection.

12 CONTRACT PRICE AND PAYMENT

12.1 Mobilisation Advance

- 12.1.1 Mobilisation Advance shall be granted to the Contractor, if required by him, with the conditions mention herein being fulfilled.
- 12.1.2 Advance shall be granted where the estimated cost of work put to tender is Rs.10 Crores or more.
- 12.1.3 The amount of mobilisation advance shall be limited to 15% of the contract value and shall be granted under following two categories:
- i) Lumpsum Advance against a non-revokable Bank guarantee acceptable to the Corporation which shall be 10% of the contract value.
 - ii) over and above (i) an Advance at 90% of the purchase price of New Plant and Equipment acquired for the work and brought to site, against production of documents in support thereof and that such plant and

equipment are hypothecated in favour of the Corporation in the form required by the Corporation. Further this new plant and equipment for which mobilisation advance applied for are not in excess of requirement and price there of considered to be reasonable by the Engineer-in-Charge. (Subject to maximum of 5% of the contract value)

- 12.1.4 The mobilization advance shall be interest bearing, and simple interest rate shall be charged on mobilization advance. The rate of interest to be charged on mobilization advance shall be as mentioned in the Schedule A.
- 12.1.5 The Contractor shall ensure that the bank guarantee is valid and enforceable until the advance payment has been repaid, but its amount shall be progressively reduced by the amount repaid by the Contractor as indicated in the Payment Certificates. If the terms of the bank guarantee specify its expiry date, and the advance payment has not been repaid within 30 days prior to the expiry date, the Contractor shall extend the validity of the guarantee till the advance payment is repaid failing the Bank guarantee may be encashed by the Corporation.
- 12.1.6 When advance granted is more than Rs.2 Crores, it shall be released in two or more equal installments as deemed necessary. The subsequent installments shall be released only on submission of proof of bonafide utilisation of earlier installments by the Contractor and to the satisfaction of Engineer-in-Charge
- 12.1.7 Unless stated otherwise in the Contract, the advance payment shall be repaid through percentage deductions from the payments against the running bills determined by the Engineer-in-charge. as follows:
- The recovery of advances shall be regulated in suitable installments commencing from 2nd RA bill or after 10% of the work is completed whichever is earlier. The payment of mobilization advance by itself shall not be considered as one of RA bill for this purpose. The entire amount of advance with interest shall be recovered before 80% of the work is completed.
- 12.1.8 Interest on the advance shall be calculated on each installment of recovery from the date of its payment as Mobilisation Advance till the preceding day of recovery from running / final bills.
- 12.1.9 Where advance payment to Contractor against running bills is to be made after effecting the recovery of Mobilisation Advance installment from the bill, the interest for advance payment shall be calculated till the preceding day of passing the bill.
- 12.1.10 If the amount payable under any interim bill is not sufficient to cover all deduction to be made for sums advanced and other sums deductible therefrom, the balance outstanding shall be deducted from subsequent bills.

12.2 Payment of Running Bills

- 12.2.1 Running bills shall be submitted, monthly by the Contractor for the work executed during the previous month along with all supporting documents on the format prescribed by the Corporation. The Engineer-in-Charge shall then arrange to have the bill verified. Where ever applicable (as defined in Schedule

A) the Contractor will submit the bills in a soft form, which shall be in the format as required by the Engineer-in-charge.

12.2.2 Payment "On Account" for amount admissible shall be made upon the Engineer-in-Charge certifying the sum to which the Contractor is considered entitled by way of interim payment for the following:-

(a) For Works :All work executed, after deducting there from the amounts already paid, the retention money and such other amounts as may be deductible or recoverable in terms of the Contract.

(b) For Materials: The Contractor on signing an indenture in the form to be specified by the Engineer-in-charge 75% percent of the cost (as assessed by the Engineer-in-Charge) of any materials which are in the opinion of the Engineer-in-Charge reasonably required in accordance with the Contract and have been brought to Site for incorporation in the Works and are safeguarded against loss due to any cause whatsoever to the satisfaction of the Engineer-in-Charge but have not been so incorporated. However, in case of perishable materials the Contractor shall provide an insurance cover for the full cost. No secured advance shall be payable on high risk material such as glass, sand, petrol/ diesel etc. The advance payments under this shall be adjusted as and when materials are utilised in the Works.

12.2.3 Payment of the Contractor's on account bill shall be made by the Corporation within 25 days from the date of submission of the bill by the Contractor along with all the supporting documents subject to the certification of the same by the Engineer-in-charge. If in the opinion of the Engineer-in-Charge it is likely to take more time for payment, an advance payment of 75% of the net bill amount shall be released to the Contractor, within 3 working days and balance payment shall be released within 30 days from the date of submission of bill.

12.2.4 Any interim bill paid, relating to work done or materials delivered, may be modified or corrected by any subsequent interim bills or by the final bill. Any Certificate of the Engineer-in-Charge supporting an interim payment shall not be conclusive evidence that any work or materials to which it relates is/are in accordance with the Contract.

12.3 Over payments and Under Payments

12.3.1 Wherever any claim for the payment of a sum of money to the Corporation arises under this Contract against the Contractor, the same may be deducted from any sum due to the Contractor under this Contract or any other Contract with the Corporation or from his security deposit; or he shall pay the claim on demand.

12.3.2 The Corporation reserves the right to carry out post payment audit and technical examination of the final bill including all supporting vouchers, abstracts etc. The Corporation further reserves the right to enforce recovery of any overpayment when detected, notwithstanding the fact that the amount of the final bill may be included by one of the parties as an item of dispute before the dispute resolution board for this Contract.

12.3.3 If as a result of such audit and technical examination any overpayment is discovered in respect of any work done by the Contractor or alleged to have

been done by him under the Contract, it shall be recovered by the Corporation from the Contractor by any or all of the legal methods prescribed above. If any under-payment is discovered, the amount shall be duly paid to the Contractor by the Corporation.

12.3.4 Provided that the aforesaid right of the Corporation to adjust over payments against amounts due to the Contractor under any other Contract with the Corporation shall not extend beyond the period of three years from the date of payment of the final bill or in case the final bill is a MINUS bill, from the date the amount payable by the Contractor under the MINUS final bill is communicated to the Contractor.

12.3.5 Any amount due to the Contractor under this Contract for under-payment may be adjusted against any amount then due or which may at any time thereafter become due before payment is made to the Contractor, from him to the Corporation on any other Contract or account whatsoever.

12.4 Time limit for Payment of Final Bill

12.4.1 The final bill shall be submitted by the Contractor within 90 days of physical completion of the works. Payment of those items of the bill in respect of which there is no dispute and of items in dispute, for quantities and at rates as approved by the Engineer-in-Charge, shall be made within the period specified hereunder. The period shall be reckoned from the date of receipt of the bill by the Engineer-in-Charge along with the all acceptable supporting documents.

(i) If the tendered value of work is upto Rs. 5 Crores : 3 months

(ii) If the tendered value of work exceeds Rs. 5 Crores : 6 months

12.4.2 The engineer-in-charge shall intimate for, if any, corrections in the final bill to Contractor. The Contractor should re-submit the bill, with corrections within the 30 days of its return by the Engineer-in-charge. The re-submitted bill will be checked and paid within the period as indicated in sub-clause 12.4.1 (i) and (ii) above (as the case may be).

12.4.3 After payment of the amount of the final bill as aforesaid has been made, the Contractor may, if he so desires, reconsider his position in respect of the disputed portion of the final bill and if he fails to do so within 90 days, his disputed claim shall be dealt with as provided in the Contract.

12.5 Delayed Payment

12.5.1 Interest at a pre-specified rate (as defined in Schedule A) shall be paid on the balance amount of the bill if not paid within the time limit specified for running and final bills as specified in sub-clause 12.2 and sub-clause 12.4 respectively. Disputed portion of bill (if any) will not attract any interest.

13 CONTRACT TERMINATION BY CORPORATION

13.1 Foreclosure of contract

13.1.1 If at any time after acceptance of the tender / during execution of work the Corporation shall decide to abandon or reduce the scope of the works for any reason whatsoever and hence not require the whole or any part of the works to be carried out, the Engineer-in-Charge shall give notice in writing to that effect to the Contractor and the Contractor shall have no claim to any payment of compensation or otherwise whatsoever, on account of any profit or advantage which he might have derived from the execution of the works in full, but which he did not derive in consequence of the foreclosure of the whole or part of the works.

13.1.2 The Contractor shall be paid at contract rates full amount for works executed at Site, on submission of the claim and review & approval of the claim by the Engineer-in-Charge.

13.1.3 The Corporation may in addition to above, compensate a reasonable amount to the Contractor on mutual agreement basis based on submission of the claim and review of the claim by the Engineer-in-Charge.

13.2 Determination/Cancellation of Contract

13.2.1 If the Contractor :

- (a) at any time makes default in proceeding with the works with due diligence and continues to do so after 7 days notice in writing from the Engineer-in-Charge; or
- (b) commits default in complying with any of the terms and conditions of the Contract and does not remedy it or take effective steps to remedy it within 7 days after a notice in writing is given to him in that behalf by the Engineer-in-Charge; or
- (c) fails to complete the works or items of work with individual dates of completion, on or before the date(s) of completion, and does not complete them within the period specified in a notice given in writing in that behalf by the Engineer-in-Charge; or
- (d) shall offer, or give or agree to give to any person in the Corporation's service or to any other person on his behalf any gift, bribe, gratuity, commission, other thing of value or consideration of any kind as an inducement or reward for doing or forbearing to do or having done or forborne to do any act in relation to the obtaining or execution of this or any other Contract for the Corporation; or
- (e) shall enter into a contract with the Corporation in connection with which commission has been paid or agreed to be paid by him or to his knowledge, unless the particulars of any such commission and the terms of payment thereof have previously been disclosed in writing to the Accepting Authority/Engineer-in-Charge; or
- (f) shall obtain a Contract with the Corporation as a result of wrong tendering or other non-bonafide methods of competitive tendering; or

- (g) being an individual, or if a firm, any partner thereof, shall at any time be adjudged insolvent or have a receiving order or order for administration of his estate made against him or shall take any proceedings for liquidation or composition (other than a voluntary liquidation for purpose of amalgamation or reconstruction) under any insolvency Act for the time being in force or make any conveyance or assignment of his effects or composition or arrangement for the benefit of his creditors or purport so to do, or if any application be made under any insolvency Act for the time being in force for the sequestration of his estate or if a trust deed be executed by him for benefit of his creditors; or
 - (h) being a company, shall pass a resolution or the Court shall make an order for the liquidation of its affairs, or a receiver or manager on behalf of the debenture holders shall be appointed or circumstances shall arise which entitle the Court or debenture holders to appoint a receiver or manager; or
 - (i) shall suffer an execution being levied on his goods and allow it to be continued for a period of 21 days; or
 - (j) assigns, transfers, sublets (engagement of labour on a piece-work basis or of labour with materials not to be incorporated in the work shall not be deemed to be subletting) or attempts to assign, transfer or sublet the entire works or any portion thereof without the prior written approval of the Engineer-in-Charge; or
 - (k) indulges in criminal proceedings / activities with the employees of the Corporation or any other sub contractor;
the Engineer-in-charge may, upon giving 7 days' notice to the Contractor, terminate the Contract and expel the Contractor from the Site. The Corporation's election to terminate the Contract shall not prejudice any other rights of the Corporation, under the Contract or otherwise.
- 13.2.2 The Engineer-in-charge shall on such determination / cancellation have powers to:
- (a) take possession of the Site and any materials, constructional plant, implements, stores, etc. thereon; and /or
 - (b) carry out the incomplete work by any means at the risk and cost of the Contractor.
- 13.2.3 On giving a notice to the Contractor, the Engineer-in-Charge by virtue of the powers vested in him can;
- (a) take possession of or
 - (b) use as on hire
- all or any tools, plants, materials and stores, in or upon the works or the Site thereof belonging to the Contractor and intended to be used for the execution of the works or any part thereof.
- The payments for the above would be as per the contract rates or in the case of these not being applicable, at current market rates to be certified by the

Engineer-in-Charge, whose certificate thereof shall be final, and binding on the Contractor.

- 13.2.4 Otherwise the Engineer-in-Charge may order the Contractor to remove such tools, plant, materials or stores from the premises. If the Contractor fails to comply with any such requisition, the Engineer-in-Charge may remove them at the Contractor's expense or sell them on account of the Contractor and his risk in all respects.

In such case, the certificate of the Engineer-in-Charge as to the expenses of any such removal and the amount of the proceeds and expense of any such sale shall be final and conclusive against the Contractor.

- 13.2.5 On determination/ cancellation of the Contract in full or in part, the Engineer-in-charge shall determine what amount, if any, is recoverable from the Contractor for completion of works or part of the works or in case the works or part of the works is not completed, the loss or damage suffered by the Corporation. In determining the amount, credit shall be given to the Contractor for the value of the work executed by him upto the time of cancellation, the value of Contractor's material taken over and incorporated in the work, and use of tools, tackles and machinery belonging to the Contractor.

- 13.2.6 Any excess expenditure incurred or to be incurred by the Corporation in completing the works or part of the works or the loss or damage suffered or may be suffered by the Corporation as aforesaid after allowing such credit shall be recovered from any money due to the Contractor on any account, and if such money is not sufficient the Contractor shall be called upon in writing to pay the same within 30 days.

- 13.2.7 If the Contractor shall fail to pay the required sum within the aforesaid period of 30 days, the Engineer-in-Charge shall have the right to retain any or all of the Contractor's unused materials, construction plant, implements, temporary buildings etc. till the balance outstanding from the Contractor is recovered in accordance with the provisions of the Contract.

- 13.2.8 In the event of anyone or more of the above courses being adopted by the Engineer-in-Charge, the Contractor shall have no claim to compensation for any loss sustained by him by reasons of his having purchased or procured any materials or entered into any engagements or made any advances on account or with a view to the execution of the work or the performance of the Contract. In case action is taken under any of the provision aforesaid, the Contractor shall not be entitled to recover or be paid any sum for any work thereof or actually executed under this Contract unless and until the Engineer-in-Charge has certified in writing the performance of such work and the value payable in respect thereof and he shall only be entitled to be paid so certified.

- 13.2.8. Any sums in excess of the amounts due to the Corporation and unsold materials, construction plant, etc., shall be returned to the Contractor, provided, always that the cost or anticipated cost of completion by the Corporation of the works or part of the works is less than the amount which

the Contractor would have been paid had he completed the works or part of the works, such benefit shall not accrue to the Contractor.

- 13.2.9. In case any of the powers conferred upon the Engineer-in-Charge by this clause become exercisable and the same are not exercised, the non-exercise thereof shall not constitute a waiver of any of the conditions hereof and such powers shall notwithstanding be exercisable in the event of any future case of default by the Contractor and the liability of the Contractor for compensation shall remain unaffected.

13.3 Termination of Contract on death

- 13.3.1 If the Contractor is an individual or a proprietary concern and the individual or the proprietor dies and if the Contractor is a partnership concern and one of the partners dies, then, unless the Engineer-in-Charge is satisfied that the legal representatives of the individual Contractor or of the proprietor of the proprietary concern and in the case of partnership, the surviving partners, are capable of carrying out and completing the Contract, the Engineer-in-Charge shall be entitled to cancel the Contract as to its incomplete part without the Corporation being in any way liable to payment of any compensation to the estate of the deceased Contractor and /or to the surviving partners of the Contractor's firm on account of the cancellation of the contract.

- 13.3.2 The decision of the Engineer-in-Charge that the legal representatives of the deceased Contractor or the surviving partners of the Contractor's firm cannot carry out and complete the Contract shall be final and binding on the parties in the event of such cancellation, the Corporation shall not hold the estate of the deceased Contractor and/or the surviving partners of the Contractor's firm liable for damages for not completing the Contract.

14 RISK AND RESPONSIBILITY

14.1 Liability for damage, defects or imperfections and rectifications thereof

- 14.1.1 If the Contractor or his workman or employees shall injure or destroy any part of the building in which they may be working or any building, road, fence, etc. contiguous to the premises on which the work or any part of it is being executed, or if any damage shall happen to the work while in progress, the Contractor shall, upon receipt of a notice in writing in that behalf make the same good at his own expense.
- 14.1.2 If it shall appear to the Engineer-in-Charge or his Representative at any time during construction or re-construction or prior to the expiration of the Defects Liability Period, that any work has been executed with unsound, imperfect or unskilled workmanship or that any materials or articles provided by the Contractor for execution of the work are not in accordance with the Contract, the contractor shall forthwith rectify or remove and re-construct the work so specified in whole or in part within the time limit specified by the Engineer-in-charge.

- 14.1.3 Failing which, the Engineer-in-Charge may rectify or remove and re-execute the work and/or remove and replace with others, the materials or articles complained of, as the case may be, by other means at the risk and expense of the Contractor.
- 14.1.4 In such case the Engineer-in-Charge may not accept the item of work at the rates applicable under the contract but may accept such items at reduced rates as the competent authority may consider reasonable during the preparation of on account bills or final bill if the item is so acceptable without detriment to the safety and utility of the item and the structure or he may reject the work outright without any payment.
- 14.1.5 In case of repairs and maintenance works, splashes and droppings from white washing, painting etc; shall be removed and surfaces cleaned simultaneously with completion of these items of work in individual rooms, quarters or premises, etc. where the work is done, without waiting for completion of all other items of work in the Contract. In case the Contractor fails to comply with the requirements of this clause, the Engineer-in-Charge shall have the right to get the work done by other means at the cost of the Contractor. Before taking such action however, the Engineer-in-Charge shall give 3 days notice in writing to the Contractor.

15 INSURANCE

15.1 General Requirements for Insurances

- 15.1.1 The Contractor shall provide in the joint names of the Corporation and the Contractor, insurance cover from the date of commencement of work to the end of the Defects Liability Period. The Contractor is liable to take Contractor's all risk policy for the whole contract value. The insurance amount shall also cover third party liability to the extent, if any as specified in Schedule A. In addition to this the contractor shall also take Workmen Compensation Policy for workmen.
- 15.1.2 Policies /certificates of insurance shall be delivered in original by the Contractor to the Engineer-in-charge before the date of commencement of work. In case of failure by the Contractor, no payment against the running bill shall be released till the submission of the policies / certificates of insurance. All such insurances shall provide for compensation to be payable in the types and proportions for which these policies are intended.
- 15.1.3 The Contractor shall provide premium receipts to the Engineer-in-Charge from time to time, as a proof that he has paid the necessary premiums for keeping the policies alive till expiry of the Defects Liability Period.
- 15.1.4 The Contractor shall ensure that similar insurance policies are taken out by his Sub-Contractors(if any) and shall be responsible for any claims or losses to the Corporation resulting from their failure to obtain adequate insurance protection in connection thereof. The Contractor shall produce or cause to be produced by his Sub-Contractors (if any) as the case may be, the relevant

policy or policies and premium receipts as and when required by the Engineer-in-Charge.

15.1.5 Alterations to the terms of insurance shall not be made without the approval of the Engineer-in-charge.

15.1.6 Both parties shall comply with all conditions of the insurance policies.

15.1.7 All risks of loss of or damage to physical property and of personal injury and death which arise during and in consequence of the execution of the Contract shall be the responsibility of the Contractor. However this shall not include excepted risks which are not covered under the above said insurance policies. All consequential loss with reference to insurance claims shall be borne by the contractor.

16 FORCE MAJEURE

16.1 Definition of Force Majeure

16.1.1 In this Clause, "Force Majeure" means an exceptional event or circumstance:

- a) which is beyond a Party's control,
- b) which such Party could not reasonably have provided against before entering into the Contract,
- c) which, having arisen, such Party could not reasonably have avoided or overcome, and
- d) which is not substantially attributable to the other Party.

Force Majeure may include, but is not limited to, exceptional events or circumstances of the kind listed below, so long as conditions (a) to (d) above are satisfied:

- i. war, hostilities (whether war be declared or not), invasion, act of foreign enemies,
- ii. rebellion, terrorism, revolution, insurrection, military or usurped power, or civil war,
- iii. riot, commotion, disorder, strike or lockout by persons other than the Contractor's Personnel,
- iv. munitions of war, explosive materials, ionising radiation or contamination by radio-activity, except as may be attributable to the Contractor's use of such munitions, explosives, radiation or radio-activity, and
- v. natural catastrophes such as earthquake, hurricane, typhoon, tsunami or volcanic activity.

16.2 Consequence of Force Majeure

16.2.1 If the Contractor is prevented from performing its substantial obligations under the Contract by Force Majeure, and suffers delay and/or incurs Cost by reason of such Force Majeure, the Contractor may be eligible to

- (a) an extension of time for any such delay, if completion is or will be delayed, under Sub-Clause 7.6 [Extension of Time for Completion], and

- (b) if the event or circumstance is of the kind described in sub-paragraphs (a) to (d) of Sub-Clause 16.1 [Definition of Force Majeure] and, in the case of sub-paragraphs (i) to (v), occurs in the Country, payment of any such costs of rectifying or replacing the Works and/or Goods damaged or destructed by Force Majeure, to the extent they are not indemnified through the insurance policy referred to in Clause 15 [Insurance].

16.2.2 The Contractor shall, as may be directed in writing by the Engineer-in-Charge, remove from the Site any debris and so much of the Works as shall have been damaged, taking to the Corporation's store such Corporation's T&P, articles and/or materials as may be directed.

16.3 Duty to Minimise Delay

16.3.1 The Contractor shall, as may be directed in writing by the Engineer-in-Charge, proceed with the erection and completion of the Works under and in accordance with the provisions and conditions of the Contract.

16.3.2 Each Party shall at all times use all reasonable endeavours to minimise any delay in the executing of the Contract as a result of Force Majeure. A Party shall give notice to the other Party when it ceases to be affected by the Force Majeure.

17 CLAIMS, DISPUTES AND ARBITRATION

17.1 Contractor's Claims

17.1.1 The Contractor may be granted extension of time and compensation under the following delay events, for the portion of delay attributable to Corporation :

- (a) if the Contractor suffers delay as a result of failure by the Corporation to give right or possession of site as per the sub-clause 2.1 (Possession of site),
- (b) if the Contractor suffers delay from executing the work due to error or incorrect data furnished by the Engineer-in-charge, as per the clause 4.6 (Setting out the work)
- (c) if there is a substantial delay in issue of drawings by the Corporation and affects the progress of work.
- (d) if there is a substantial delay in issue of material agreed as per the contract to be supplied by Corporation and affects the progress of work

17.1.2 The contractor shall be eligible, based on reported and agreed delays attributable to the corporation, to extension of time for the full delay subject to the provisions of Sub-Clause 7.6 [Extension of Time for Completion] and in addition for Compensation for the same period which would be mutually agreed based on the initiation made by the Contractor with proper supporting documents. The Contractor shall serve a notice for claim within 90 days after the Contractor became aware, should have become aware, of the event or circumstance, as stated under (a) to (d) above. The settlement of the claims shall be made at the end of the completion of contract.

17.1.3 If the Contractor fails to give notice of a claim within period of 90 days, the Contractor shall not be eligible to additional payment, and the Corporation shall be discharged from all liability in connection with the claim. Otherwise, the following provisions of this Sub-Clause shall apply.

17.1.4 The Contractor shall keep such contemporary records as may be necessary to substantiate any claim, either on the Site or at another location acceptable to the Engineer. Without admitting the Corporation's liability, the Engineer-in-charge may, after receiving any notice under this sub-clause, monitor the record-keeping and/or instruct the Contractor to keep further contemporary records. The Contractor shall permit the Engineer-in-charge to inspect all these records, and shall (if instructed) submit copies to the Engineer-in-charge.

17.1.5 Within 15 days after the Contractor gives notice, or within such other period as may be proposed by the Contractor and approved by the Engineer-in-charge, the Contractor shall send to the Engineer-in-charge a fully detailed claim which includes full supporting particulars of the basis of the claim. If the event or circumstance giving rise to the claim has a continuing effect:

- (a) this claim shall be considered as interim;
- (b) the Contractor shall send further interim claims at monthly intervals, giving the accumulated delay and/or amount claimed, and such further particulars as the Engineer-in-charge may reasonably require; and
- (c) the Contractor shall send a final claim within 30 days after the end of the effects resulting from the event or circumstance, or within such other period as may be proposed by the Contractor and approved by the Engineer-in-charge.

The Engineer-in-charge shall examine and accumulate all claims received under this clause, for settlement of the claim immediately after the close of the contract.

In case Contractor, at the end of the contract, has dispute over the claim admitted by the Engineer-in-charge he may consider that the claim is rejected by the Engineer and any of the Parties may refer it to the Dispute Board in accordance with Sub-Clause 17.4 [Obtaining Dispute Resolution Board's Decision].

17.2 Dispute Resolution

17.2.1 Disputes if not resolved at the level of Engineer-in-charge, will be referred to a committee appointed by the CMD, NPCIL, before the matter is referred to Dispute Resolution Board.

17.3 Appointment of the Dispute Resolution Board

17.3.1 The present sub-clause 17.3 and the forth coming sub-clauses 17.4, 17.5, 17.6 and 17.7 relating to appointment of dispute resolution board, obtaining Dispute resolution Board's decision, amicable settlement, Failure to comply to with Dispute resolution Board's decision and expiry of Dispute resolution board's appointment shall not be applicable in respect of a contract having the total

value of less than Rs. 100 Crores at the time of award of contract. With a view to clarify the doubt, if any, it is declared that clause 17.3 to 17.7 shall be applicable in respect of the contract having value more than Rs. 100 Crores. In such cases, where the value of the contract is less than Rs. 100 Crores, the disputes, differences shall be settled and decided in accordance with clause 17.8 of this General Conditions of Contract.

- 17.3.2 If a dispute (of any kind whatsoever) arises between the Parties in connection with, or arising out of, the Contract or the execution of the Works, including any dispute as to any certificate, determination, instruction, opinion or valuation by the Engineer-in-charge, either Party may refer the dispute in writing to the Dispute resolution board for its decision, with copies to the other Party.
- 17.3.3 The Dispute Resolution Board (DRB) shall be established by signature of the Dispute Resolution Board Agreement ("the Board Agreement") which shall be made effective from the same time as the signature of the Contract Agreement.
- 17.3.4 The Board shall comprise three Members experienced in the type of work involved and in the interpretation of document. One Member shall be selected by each of the Corporation and the Contractor and approved by the other.
- 17.3.5 The third Member shall be selected by the other two and approved by the parties. The third Member shall serve as Chairman of the Board.
- 17.3.6 The terms of the remuneration of each of the three members, including the remuneration of any expert whom the Dispute Resolution Board consults, shall be mutually agreed upon by the Parties when agreeing the terms of appointment of the member or such expert (as the case may be). Each Party shall be responsible for paying one-half of this remuneration.
- 17.3.7 In the event of death, disability, or resignation of any Member, such Member shall be replaced in the same manner as the Member being replaced was selected. If for whatever other reason a Member shall fail or be unable to serve, the Chairman (or failing the action of the Chairman then either of other Members) shall inform the parties and such non- serving Member shall be replaced in the same manner as the Member being replaced was selected. Replacement shall be considered complete when the new Member signs the Board Agreement. Throughout any replacement process the Members not being replaced shall continue to serve and the Board shall continue to function and its activities shall have the same force and effects as if the vacancy had not occurred.

17.4 Obtaining Dispute Resolution Board's Decision

- 17.4.1 The DRB shall be deemed to have received any reference on the date when it is received by the chairman of the DRB.
- 17.4.2 Both Parties shall promptly make available to the DRB all such additional information, further access to the Site, and appropriate facilities, as the DRB may require for the purposes of making a decision on such dispute. The DRB shall be deemed to be not acting as arbitrator(s).
- 17.4.3 If the Dispute Resolution Board has given its decision as to a matter in dispute to

both Parties, and no notice of dissatisfaction has been given by either Party within 30 days after it received the DRB's decision, then the decision shall become final and binding upon both Parties.

17.4.4 Any dispute on which the Board has not issued a Recommendation within 45 days of its final hearing on the dispute, or regarding which the Recommendation (s) are not accepted, may be referred in writing by either party to arbitration in accordance with this Clause, by written notice to the other party with copies to the the Board. Such notice shall state that it is being made pursuant to this Clause and shall establish the entitlement of the party giving it to commence arbitration provided that no such arbitration may be commenced until such notice is given. Such reference shall be made within 15 days of receipt of the Board's recommendation (s), or within 15 days of the day on which said period of 45 days expired, as the case may be, failing which reference any recommendation (s) previously rejected or not accepted shall be deemed accepted despite such previous rejection or non-acceptance and shall be final and binding upon the parties.

17.4.5 All Recommendations, which have become final and binding, shall be implemented by the parties forthwith; such implementation shall include any relevant action of the Engineer-in-charge.

17.4.6 Whether or not accepted or deemed accepted, all of the Recommendations shall be admissible in any subsequent dispute resolution procedure, including any arbitration or any litigation having any relation to the dispute or disputes to which the Recommendation(s) relate.

17.4.7 Unless the Contract has already been repudiated or terminated, the Contractor shall, in every case, continue to proceed with the Works with all due diligence and the Contractor and the Corporation shall give effect forthwith to every decision of the Engineer-in-charge unless and until the same shall be revised, as hereinafter provided, in an arbitral award.

17.5 Amicable Settlement

17.5.1 Where notice of dissatisfaction has been given under Sub-Clause 17.4[Obtaining Dispute Resolution Board's Decision] above, both Parties shall attempt to settle the dispute amicably before the commencement of arbitration. However, unless both Parties agree otherwise, arbitration may be commenced on or after the 60th day after the day on which a notice of dissatisfaction and intention to commence arbitration was given, even if no attempt at amicable settlement has been made.

17.6 Failure to Comply with Dispute Resolution Board's Decision

17.6.1 In the event that a Party fails to comply with a final and binding DRB decision, then the other Party may, without prejudice to any other rights it may have, refer the failure itself to arbitration under sub-clause 17.8 [Arbitration]. Sub-clause 17.4 [Obtaining Dispute Resolution Board's Decision] and sub-clause 17.5 [Amicable Settlement] shall not apply to this reference.

17.7 Expiry of Dispute Resolution Board's Appointment

- 17.7.1 If a dispute arises between the Parties in connection with, or arising out of, the Contract or the execution of the Works and there is no DRB in place, whether by reason of the expiry of the DRB's appointment or otherwise:
- (a) Sub-Clause 17.4 [Obtaining Dispute Resolution Board's Decision] and Sub-Clause 17.5 [Amicable Settlement] shall not apply, and
 - (b) the dispute may be referred directly to arbitration under Sub-Clause 17.8 [Arbitration].

17.8 Arbitration

- 17.8.1 Any dispute not settled amicably and in respect of which the DRB's decision (if any) has not become final and binding shall be finally settled by arbitration. Unless otherwise agreed by both Parties:
- i) For contracts with foreign contractors:
 - a) International arbitration with proceedings administered by the international arbitration institution appointed by the corporation, in accordance with the rules of arbitration of the appointed institution;,
 - b) the place of arbitration shall be the city where the headquarters of the appointed arbitration institution is located or such other place selected in accordance with the applicable arbitration rules; and
 - c) the arbitration shall be conducted in the language for communications defined in Sub-Clause 1.3 ; and
 - ii) For contracts with domestic contractors, arbitration with proceedings conducted in accordance with the Indian Arbitration and Conciliation Act, 1996:
 - a) All questions and disputes relating to the meaning of the specifications, designs, drawings and instructions herein before contained in this Contract or as to the quality of the workmanship or materials used on the work or arising out of the terms and conditions of the Contract whether during the progress of the work or after the completion or abandonment thereof, at the request of the aggrieved party in writing, shall be referred to the sole arbitration of the person and appointed by the Chairman & Managing Director, Nuclear Power Corporation of India Ltd, in respect of the contracts entered for and on behalf of the Corporation, by any Officer / Authority of the Corporation.
 - b) When it appears to the person that there exists an element of a settlement which may be acceptable to the parties, he shall submit them to parties for their observation. He may reformulate the terms of a possible settlement in the light of their observations.
 - c) If the parties reach agreement of the dispute, they may draw up and sign a written settlement agreement. They may request the person to draw up or assist them in drawing up the settlement agreement.
 - d) If settlement agreement shall have the same status and effect as if it is an arbitral award on agreed terms on the substance of the dispute rendered by an arbitral tribunal under section 30 of the Act.

- e) If a settlement does not appear possible, the person, after consultation with the parties, will give a written declaration that further efforts at Conciliation are no longer justified and the person proceedings are terminated.
- f) When Conciliation proceedings have become infructuous or have been terminated, the party, which initiated the Conciliation, shall refer the disputes for Arbitration. The reference to Arbitration should be made preferably within 30 days of the termination of Conciliation Proceedings.
- g) The Arbitration shall be conducted in accordance with the Indian Arbitration and Conciliation Act, 1996. For Contracts costing upto Rs. 10 Crores, a Sole Arbitrator shall be appointed. For Contracts costing over Rs. 10 Crores, a Committee of Arbitrators shall be appointed composed of one Arbitrator to be by the Contractor, one to be by the Owner and the third Arbitrator, who will act as a Chairman but not as umpire, to be chosen jointly by the two nominees. The decision of majority of Arbitrators shall be final and binding on both parties.

19. CONTRACTORS` LABOUR REGULATIONS AND FORMS

1. Definitions:

In these regulations, unless otherwise expressed or indicated, the following words and expression shall have the meaning hereby assigned to them:

- (a) **"Workmen"** means any person employed by the contractor, directly or indirectly through a sub-contractor, to do any skilled, semi-skilled or unskilled manual, supervisory, technical or clerical work for hire or reward, whether the terms of employment are expressed or implied but does not include any person-
 - 1. Who is employed mainly in managerial or administrative capacity; or
 - 2. Who, being employed in supervisory capacity draws wages exceeding five hundred rupees per mensem or exercise either by the nature of the duties attached to the office or by reason of powers vested in him, functions mainly of managerial nature;
 - 3. Who is an out worker, that is to say, a person to whom any article or materials are given out by or on behalf of the principal employer to be made up, cleaned washed, altered, ornamental finished, repaired, adopted or otherwise processed for sale for the purposes of the trade or business of the principal employer and the process is to be carried out either in the home of the out worker or in some other premises, not being premises under the control and management of the principal employer.
- (b) **"Fair Wage"** means wages, which shall include wages for weekly day of rest and other allowances, whether for time or piece work, after taking into consideration prevailing market rates for similar employments in the neighborhood but shall not be less than the minimum rates of wages fixed under The Minimum Wages Act.
- (c) **"Contractor"** for the purpose of these regulations shall include an agent or sub-contractor employing labour on the work taken on contract.
- (d) **"Inspecting Officer"** means any Labour Enforcement Officer, or Assistant Labour Commissioner of the Chief Labour Commissioner's Organisation.
- (e) **"Form"** means a form appended to these Regulations.

2. Notice of commencement: The Contractor shall, within **SEVEN** days of commencement of the work, furnish in writing to the Inspecting Officer of the area concerned the following information:

- (a) Name and situation of the work
- (b) Contractors` name and address
- (c) Particulars of the Department for which the work is undertaken

- (d) Name and address of sub-contractors as and when they are appointed
- (e) Commencement and probable duration of the work
- (f) Number of workers employed and likely to be employed
- (g) "Fair wages" for different categories of workers

3 (i) **Number of hours of work which shall constitute a normal working day:-**

The number of hours which shall constitute a normal working day for an adult shall be NINE hours. The working day of an adult worker shall be so arranged that inclusive of intervals, if any, for rest, it shall not spread over more than twelve hours on any day; when an adult worker is made to work for more than NINE hours on any day or for more than FORTY EIGHT hours in any week, he shall, in respect of overtime work, be paid wages at double at ordinary rate of wages.

(ii) **Weekly day of rest :**

Every worker shall be given a weekly day of rest which shall be fixed and notified at least TEN days in advance. A worker shall not be required or allowed to work on the weekly rest day unless he has or will have a substituted rest day, on one of the five day immediately before or after the rest day. Provided that no substitution shall be made which will result in the worker working for more than ten days consecutively without a rest day for a whole day.

Where in accordance with the foregoing provisions a worker works on the rest day and has been given a substituted rest day he shall be paid wages for the work done on the weekly rest day at the overtime rate of wages.

NOTE : The expression "ordinary rate of wages" means the fair wage the worker is entitled to.

4. **Display of notice regarding Wages, Weekly Day of Rest etc.,:**

The Contractor shall, before he commences his work on Contract, display and correctly maintain and continue to display and correctly maintain in a clean and legible condition in conspicuous places on the works, notice in English and in the local Indian Language spoken by majority of workers, giving the rate of fair wages, the hours of work for which such wages are payable, the weekly rest days workers are entitled to and name and address of the Inspecting Officer. The Contractor shall send a copy each of such notices to the Inspecting Officers.

5. **Fixation of Wage Periods :**

The Contractor shall fix wage periods in respect of which wages shall be payable. No wage period shall normally exceed one week.

6. Payment of Wage:

- (i) Wages due to every worker shall be paid to him direct. All wages shall be paid in current coins or currency or in both.
- (ii) Wages of every worker employed on the Contract shall be paid where the wage period is one week, within THREE days from the end of the Wage period; and in any other case before the expiry of the 7th day or 10th day from the end of the wage period according as the number of workers does not exceed 1,000 or exceeds 1,000.
- (iii) When employment of any worker is terminated by or on behalf of the Contractor, the wages earned by him shall be paid before expiry of the day succeeding the one on which his employment is terminated.
- (iv) Payment of wages shall be made at the work site on a working day except when the work is completed before expiry of the wage period, in which case final payment shall be made at the work site within 48 hours of the last working day and during normal time.

NOTE : The term "working day" means a day on which the work on which labour is employed, is in progress.

7. Register of Workmen :

A register of workmen shall be maintained in the Form appended to these regulations and kept at the work site or as near to it as possible, and relevant particulars of every workman shall be entered therein within THREE days of his employment. (Ref. Appendix I)

8. Employment Card:

The Contractor shall issue an employment card in the Form appended to these regulations to each worker on the day of work or entry into his employment. If a worker already has any such card with him issued by the previous employer, the contractor shall merely endorse that Employment Card with relevant entries. On termination of employment the Employment Card shall again be endorsed by the Contractor and returned to the worker. (Appendix II)

9. Register of Wages etc. :

- (i) A Register of Wages-Cum-Muster Roll in the Form appended to these regulations shall be maintained and kept at the work site or as near to it as possible. (Appendix III).

- (ii) A wage slip in the Form appended to these regulations shall be issued to every worker employed by the Contractor at least a day prior to disbursement of wages. (Appendix IV).

10. Fines and deductions which may be made from Wages:

- (i) Wages of a worker shall be paid to him without any deduction of any kind except the following:
 - (a) fines;
 - (b) deductions for absence from duty; i.e. from the place of his employment he is required to work. The amount of deduction shall be in proportion to the period for which he was absent;
 - (c) deduction for damage to or loss of goods expressly entrusted to the employed person for custody, or for loss of money which he is required to account for, where such damage or loss is directly attributable to his neglect or default;
 - (d) deductions for recovery of advances or for adjustment or overpayment of wages, Advance granted shall be entered in a register; and
 - (e) any other deduction which the Corporation may from time to time allows.
- (ii) No fines shall be imposed on any worker say in respect of such acts and omissions on his part as has been approved by the Chief Labour Commissioner.
- (iii) No fine shall be imposed on a worker and no deductions for damage or loss shall be made from his wages until the worker has been given an opportunity of showing causes against such fines or deductions.
- (iv) The total amount of fines which may be imposed in any one wage period on a worker shall not exceed an amount equal to three paise in a rupee of the wages payable to him in respect of that wage period.
- (v) No fine imposed on a worker shall be recovered from him in installments, or after expiry of sixty days from the date on which it was imposed. Every fine shall be deemed to have been imposed on the day of the act or omission in respect of which it was imposed.
- (vi) The contractor shall maintain both in English & the local Indian language a list, approved by the Chief Labour Commissioner, clearly stating the acts and omissions for which penalty or fine may be imposed on a workman and display it in a good condition in a conspicuous place on the work site. (Appendix V)

- (vii) The Contractor shall maintain a register of fines and the register of deductions for damage or loss in the Forms appended to these regulations which should be kept at the place of work.(Appendix VI & VII).

11. Register of Accidents :

The Contractor shall maintain a register of accidents in such form as may be convenient at the work place but the same shall include the following particulars.

- (a) Full particulars of the labourers who met with accident.
- (b) Rate of Wages
- (c) Sex
- (d) Age
- (e) Nature of accident and cause of accident
- (f) Time and date of accident
- (g) Date and time when admitted in hospital
- (h) Date of discharge from the hospital
- (i) Period of treatment and result of treatment
- (j) Percentage of loss of earning capacity and disability as assessed by Medical Officer
- (k) Claim required to be paid under Workmen's Compensation Act
- (l) Date of payment of compensation
- (m) Amount paid with details of the person to whom the same was paid
- (n) Authority by whom the compensation was assessed
- (o) Remarks

12. Preservation of Registers :

The Register of workmen and the Register of Wages-cum- Muster Roll required to be maintained under these Regulations shall be preserved for 3 years after the date on which the last entry is made therein.

13. Enforcement :

The Inspecting Officer shall either on his own motion or on a complaint received by him carry out investigations, and send a report to the Engineer-In-Charge specifying the amounts representing Workers' dues and amount of penalty to be imposed on the Contractor for breach of these Regulations, that have to be recovered from the Contractor, indicating full details of the recoveries proposed and the reasons therefore. It shall be obligatory on the part of the Engineer-In-Charge on receipt of such a report to deduct such amounts from payment due to the Contractor.

14. Disposal of amounts recovered from the Contractor :

The Engineer-In-Charge shall arrange payment to workers concerned within FORTY FIVE days from receipt of a report from the Inspecting Officer except in cases where the Contractor had made an appeal under Regulation 16 of these Regulations. In

cases where there is an appeal, payment of workers dues would be arranged by the Engineer-In-Charge, wherever such payments arise, within THIRTY days from the date of receipt of the decision of the Regional Labour Commissioner (RLC).

15. Welfare Fund :

All moneys that are recovered by the Engineer-In-Charge by way of workers dues, which could not be disbursed to workers within the time limit prescribed above, due to reasons such as whereabouts of workers not being known, death of workers, etc. and also amounts recovered as penalty, shall be credited to a Fund to be kept under the custody of the Corporation for such benefit and welfare of workmen employed by Contractors.

16. Appeal against decision of Inspecting Officer:

Any person aggrieved by a decision of the Inspecting Officer may appeal against such decision to the Regional Labour Commissioner concerned within THIRTY days from the date of the decision, forwarding simultaneously a copy of his appeal to the Engineer-in-Charge. The decision of the Regional Labour Commissioner shall be final and binding upon the Contractor and the workmen.

17. Representation of parties:

- (i) A workman shall be entitled to be represented in any investigation or enquiry under these Regulations by an officer of a registered trade union of which he is a member or by an officer of a Federation of Trade Unions to which the said trade union is affiliated or where the workman is not a member of any registered trade union, by an official of a registered trade union, connected with, or by any other workman employed in, the industry in which the worker is employed.
- (ii) A contractor shall be entitled to be represented in any investigation enquiry under these Regulations by an officer of an association of Contractors of which he is a member or by an officer of a Federation associations of contractors to which the said association is affiliated where the contractor is not a member of any association of contractors, by an officer of association of employers, connected with, or by any other employer engaged in, the industry in which the contractor is engaged.
- (iii) No party shall be entitled to be represented by a legal practitioner in investigation or enquiry under these Regulations.

18. Inspection of Books and other Documents:

The Contractor shall allow inspection of the Registers and other documents prescribed under these Regulations by Inspecting Officers and the Engineer-in-charge or his authorised representative at any time and by the worker or his agent on receipt of due notice at convenient time.

19. **Interpretation, etc. :**

On any question as to the application interpretation or effect of these Regulations, the decision of the Chief Labour Commissioner or Deputy Chief Labour Commissioner (Central) shall be final and binding.

20. **Amendments**

Central Government may from time to time, add to or amend these Regulations and issue such directions as it may consider necessary for the proper implementation of these Regulations or for the purpose of removing any difficulty which may arise in the administration thereof.

Appendix – I

Register of workmen

(Regulation 7)

- i) Name and address of the Contractor _____
- ii) Number and date of Contract _____
- iii) Name and address of the Department awarding the contract _____
- iv) Nature of the Contract and location of the work _____
- v) Duration of the Contract _____

Sr. No	Name and Surname of the workers	Age & Sex	Father's/ Husband's Name	Nature of Employment & Designation	Permanent Home Address of Employee (Village, Distt. Thana)	Present Address	Date of Commencement of employment	Date of termination or leaving of employment	Signature or thumb impression of the employee	Remarks
1	2	3	4	5	6	7	8	9	10	11

Appendix – 2
EMPLOYMENT CARD
(Regulation 8)

- i) Name and Sex of the worker _____
- ii) Father's/Husband's Name _____
- iii) Address _____
- iv) Age or Date of Birth _____
- v) Identification mark _____
- vi) Name and sex of the worker _____

Particulars of next of kin (Wife/Husband and Children, if any, or of dependent next of kin in case the worker has no wife / husband or child)

Name

Full Address of Dependent

(Specify, Village, Distt and State)

Sr No.	Name and address of employer (specify whether a contractor or a sub-Contractor)	Particulars of location of work site and description of work done	Total period for which the worker is employed (fromto)	Actual number of days worked	Leave taken (No. days should be specified)	Nature of work done by the worker	Wage period	Wage rate with particulars of unit in case of piece work	Total wage earned by the worker during the period shown under Col. 5	Remarks	Signature of the employer
1	2	3	4	5	6	7	8	9	10	11	12

N.B. For a worker employed at one time piece work basis and at another on daily wages, relevant entries in respect of each type of employment should be made separately.

Appendix – 3

REGISTER OF WAGES - CUM - MUSTER ROLL (Regulation 9)

- i) Name & Address of the contractor _____
- ii) Number and date of Contract _____
- iii) Name and address of the Department awarding the Contract _____
- iv) Nature of the Contract and location of the work _____
- v) Duration of the Contract _____
- vi) Wage Period _____

Sl. No.	Name and Surname of the worker	Father's/ Husbands Name	Sex	Designation/ Nature of work	Daily attendance (No. of Units 1, 2, 3, 4, 5, 6, 7)	Fair Wages Payable				Wages Paid			Overtime Worked			Deduction from wages									
						Total Attendance	Basic	D.A. & other allowance		Basic	D.A. & other allowance	Total wages paid	Date	No. of Hrs.	Over time wages earned		Fine	Deduction for Damage or loss	House Rent	Recovery of	Other deductions	Net Wages payable	Date of Payment	Signature / Thumb impression of worker	Remarks
1	2	3	4	5	6	7	8	9		10	11	12	13	14			16	17	18	19	20	21	22	23	24

Reasons to be recorded in Col. 24

Appendix-4
WAGE SLIP

(Regulation 9)

i) Name of the Contractor _____

ii) Place _____

-
- | | | |
|-----|---|---|
| 1. | Name of the Workers with father`s/
husband`s name | : |
| 2. | Nature of Employment | : |
| 3. | Wage period | : |
| 4. | Rate of Wages Payable | : |
| 5. | Total attendance/Unit of work done | : |
| 6. | Date on which overtime worked | : |
| 7. | Overtime Wages | : |
| 8. | Gross Wages Payable | : |
| 9. | Total Deductions (indicating nature of
deductions) | : |
| 10. | Net Wages Payable | : |
-

Contractor's Signature/
Thumb Impression

Employees' Signature/
Thumb Impression

Appendix - 5

LIST OF ACTS AND OMISSIONS FOR WHICH FINES CAN BE IMPOSED

(REGULATION NO. 10 VI)

In accordance with rule 10 (vi) Contractor's Labour Regulations to be displayed prominently at the site of work both in English and local Language.

1. Willful insubordination or disobedience, whether alone or in combination with other.
2. Theft, fraud or dishonesty in connection with the Contractors beside a business or property of Corporation.
3. Taking or giving bribes or any illegal gratifications.
4. Habitual late attendance.
5. Drunkenness fighting, riotous or disorderly or indifferent behavior.
6. Habitual negligence.
7. Smoking near or around the area where combustible or other materials are locked.
8. Habitual indiscipline.
9. Causing damage to work in the progress or to property of the Corporation or of the Contractor.
10. Sleeping on duty.
11. Malingering or slowing down work .
12. Giving of false information regarding name, age father's name etc.,
13. Habitual loss of wage cards supplied by the employers.
14. Unauthorized use of employer's property for manufacturing or making of unauthorised articles at the work place.
15. Bad workmanship in construction and maintenance by skilled workers which is not approved by the Corporation and for which the contractors are compelled to undertake rectifications.

16. Making false complaints and/or misleading statements.
17. Engaging on trade within the premises of the establishments.
18. Any unauthorised divulgence of business affairs of the employees.
19. Collection or canvassing for the collection of any money within the premises of an establishment unless authorised by the employer.
20. Holding meeting inside the premises without previous sanction of the employers.
21. Threatening or intimidating any workman or employer during the working hours within the premises.

Appendix –6

REGISTER OF FINES

Regulation No. 10 (vii)

Sr. No.	Name	Father's/ Husband's Name	Sex	Department	Nature and date of offence for fines imposed	Whether workman showed offence cause against fine or not, if so enter data	Rate of wages	Date and amount of fine imposed	Date on which fine realised	Remarks
1	2	3	4	5	6	7	8	9	10	11

Appendix – 7

3. REGISTER OF DEDUCTIONS FOR DAMAGES OR LOSS CAUSED TO THE CORPORATION BY THE NEGLIGENCE OR DEFAULT OF THE EMPLOYED PERSONS.

Regulation No. 10 (vii)

Sr. No.	Name	Father's / Husband's Name	Sex	Department	Damage or loss caused with date	Whether worker showed cause against deduction, if so enter date	Date & amount of deduction imposed	Number of installments if any	Date on which total amount realized	Remarks
1	2	3	4	5	6	7	8	9	10	11

20. MODEL RULES FOR LABOUR WELFARE

1. Definitions:

- (a) "Work Place" means a place at which, on an average, twenty or more workers are employed.
- (b) "Large work place" means a place at which, on an average 500 or more workers are employed.

2. First Aid :

At every workplace, there shall be maintained in a readily accessible place first aid appliances including an adequate supply of sterilized dressings and sterilized cotton wool as prescribed in the Factory Rules of the State in which the work is carried on. The appliances shall be kept in good order and in large work-places, they shall be placed under the charge of a responsible person who shall be readily available during working hours.

At large workplaces, where hospital facilities are not available within easy distance of the works First Aid Posts shall be established and be run by trained compounders.

Where large workplaces are remotely situated and far away from regular hospitals, an indoor ward shall be provided with one bed for every 260 employees.

Where large workplaces are situated in cities, towns or in their suburbs and no beds are considered necessary owing to proximity of city or town hospitals, suitable transport shall be provided to facilitate removal of urgent cases to these hospitals. At other workplaces, some conveyance facilities shall be kept readily available to take injured person or person suddenly taken seriously ill, to the nearest hospital.

At large workplaces these shall be provided and maintained an ambulance room of the prescribed sizes, containing the prescribed equipment and in the charge of such medical and nursing staff as may be prescribed. For the purpose the relevant provisions of the Factory Rules of the State Government of the area where the work is carried on may be taken as the prescribed standard.

3. Accommodation for Labour :

The Contractor shall during the progress of the works provide, erect and maintain necessary temporary living accommodation and ancillary facilities for

labour at his own expense and to standards and scales as approved by the Engineer-in-Charge.

4. **Drinking water :**

In every workplace, there shall be provided and maintained at suitable places easily accessible to labour, a sufficient supply of cold water fit for drinking.

Where drinking water is obtained from an intermittent public water supply each workplace shall be provided with storage where drinking water shall be stored.

Every water supply storage shall be at a distance of not less than 15 meters from any latrine drain or other source of pollution. Where water has to be drawn from an existing well, which is within such proximity of latrine, drain or any other source of pollution, the well shall be properly chlorinated before water is drawn from it for drinking. All such wells shall be entirely closed in and be provided with a trap door which shall be dust and water-proof.

A reliable pump shall be fitted to each covered well, the trap door shall be kept locked and opened only for cleaning or inspection which shall be done at least once a month.

5. **Washing and Bathing Places :**

Adequate washing and bathing places shall be provided separately for man women. Such places shall be kept in clean and drained condition.

6. **Scale of Accommodation in Latrines and Urinals :**

There shall be provided within the precincts of every workplace latrines and urinals in an accessible place, and the accommodation, separately for each of these, shall not be less than at the following scales:-

	<i>No. of Seats</i>
(a) Where number of persons does not exceed 50	2
(b) Where number of persons exceeds 50 but does not exceed 100	3
(c) For additional persons per 100 or part thereof	3

In particular cases, the Engineer-in-Charge shall have the power to increase the requirement, where necessary.

7. Latrines and Urinals :

Except in workplaces provided with water flushed latrines connected with a water-borne sewage system. All latrines shall be provided with receptacles or dry-earth system which shall be cleaned at least four times daily and at least twice during working hours and kept in a strictly sanitary condition. Receptacles shall be tarred inside and outside at least once a year. If women are employed, separate latrine and urinals screened from those for men and marked in the vernacular in conspicuous letters "For Women Only" shall be provided on the scale laid down in rule 6. Those for men shall be similarly marked "For Men Only". A poster showing the figure of a man and of a woman shall also be exhibited at the entrance to latrines for each sex. There shall be adequate supply of water close to latrines and urinals.

8. Construction of Latrines:

Inside walls shall be constructed of masonry or some suitable heat resisting nonabsorbent materials and shall be cement washed inside and outside at least once a year. The dates of cement washing shall be noted in a register maintained for the purpose and kept available for inspection. Latrines shall have at least thatched roof.

9. Disposal of Excreta :

Unless otherwise arranged for by the local-sanitary authority, arrangements for proper disposal of excreta by incineration at the workplace shall be made by means of a suitable incinerator approved by the local medical health and municipal or cantonment authorities. Alternatively excreta may be disposed off by putting a layer of night soils at the Bottom of pucca tank prepared for the purpose and covering it with a 15 cm layer of waste or refuse and then covering it with a layer of earth for a fortnight(when it will turn into manure).

The Contractor shall, at his own expense, carry out all instructions issued to him by the Engineer-in-charge to effect proper disposal of soil and other conservancy work in respect of Contractor's work people or employees on the Site. The Contractor shall be responsible for payment of any charges which may be levied by municipal or cantonment authority for execution of such work on his behalf.

10. Provision of shelters during rest :

At every work place there shall be provided free of cost, four suitable sheds, two for meals and two others for rest, separately for use of men and women Labour. Height of each shelter shall not be less than 3 meters from floor level to lowest part of roof. Sheds shall be kept clean and the space provided shall be on the basis of at least 0.5 sq.m. per head.

11. Crèches :

At a place at which 20 or more women workers are ordinarily employed, there shall be provided at least one hut for use of children under the age of 6 years belonging to such women, Huts shall not be constructed to a standard lower than that of thatched roof, mud floor and wall with wooden plants spread over mud floor and covered with matting.

Huts shall be provided with suitable and sufficient openings for light and ventilation. There shall be adequate provision of sweepers to keep the places clean. There shall be two dais in attendance. Sanitary utensils shall be provided to the satisfaction of local medical health and municipal or cantonment authorities. Use of huts shall be restricted to children their attendance and mothers of children.

Where the number of women workers is more than 25 but less than 50, the Contractor shall provide at least one hut and one dai to look after children of women workers.

Size of creche (s) shall vary according to the number of women workers employed.

Creche (s) shall be properly maintained and necessary equipment like toys etc., provided.

12. Canteen :

A cooked food canteen on a moderate scale shall be provided for the benefit of workers wherever it is considered necessary.

13. Planning :

Setting and erection of the above mentioned structures shall be approved by the Engineer-in-Charge, and the whole of such temporary accommodation shall at all times during the progress of the works be kept tidy and in a clean and sanitary condition to the satisfaction of the Engineer-in-Charge and at the Contractor's expenses. The Contractor shall conform generally to sanitary requirements of local medical, health and municipal or cantonment authorities and at all times adopt such precautions as may be necessary to prevent soil pollution of the Site.

On completion of the Works the whole of such temporary structures shall be cleared away, all rubbish burnt, excreta or other disposal pits or trenches filled in and effectively sealed off and the whole of site left clean and tidy to the entire satisfaction of the Engineer-in-Charge and at the Contractor's expenses.

14. Anti-malarial precautions :

The Contractor shall, at his own expense, conform to all anti-malarial instructions given to him by the Engineer-in-Charge, including filling up any borrow pits which may have been dug by him.

15. Enforcement :

The Inspecting Officer mentioned in the Contractors Labour Regulations or any other officer nominated in his behalf by the Engineer-in-Charge shall report to the Engineer-in-Charge all cases of failure on the part of the Contractor and or his sub-contractors to comply with the provisions of these Rules either wholly or in part and the Engineer-in-Charge shall impose such fines and other penalties as are prescribed in the conditions.

16. Interpretations etc. :

On any question as to the application, interpretation or effect of these Rules, the decision of the Chief Labour Commissioner or Deputy Chief Labour Commissioner(Central) shall be final and binding.

17. Amendments :

Government may, from time to time add to or amend these Rules and issue such directions as it may consider necessary for the proper implementation of these Rules or for the purpose of removing any difficulty which may arise in the administration thereof.

21. AERB Safety Guide

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1. INTRODUCTION

Many of the works of Department of Atomic Energy at its various sites are executed by the Contractors. During these works, contractors personnel are likely to be exposed to different types of hazards. Similarly, unsafe acts of contractors personnel may generate hazards for Departmental staff and / or workmen of other contractors working at the site. Such unsafe acts may also pose danger to the existing installations and even to members of public. This guide is prepared to facilitate safe working during execution of contract works. It is hoped that units of DAE may issue this guide as a part of contract documents while awarding contracts.

2. GENERAL SAFETY PROVISIONS

- 2.1 The Contractor shall take all safety precautions during the execution of awarded work and shall maintain and leave the site safe at all times. At the end of each working day and at all times when the work is temporarily suspended, he shall ensure that all materials, equipment and facilities will not cause damage to existing property, personal injury or interfere with the other works of the Project or Station. The Contractor shall comply with all applicable provisions of the safety regulations, clean up programme and other measures that are in force at the site.
- 2.2 The Contractor shall provide and maintain all lights, guards, fencing, warning signs, caution boards and other safety measures and provide for vigilance as and where necessary or as required by the Engineer-in-charge or by any duly constituted authority for the protection of workers or for the safety of others. The caution boards shall also have appropriate symbols.
- 2.3 Adequate lighting facilities such as flood lights, hand lights and area lighting shall be provided by the Contractor at the site of work, storage area of materials and equipment and temporary access roads within his working area. The contractor shall obtain written approval of the Engineer-in-charge to the lighting scheme and place of tapping prior to its installation.
- 2.4 The Contractor shall plan his operation so as to avoid interference with the other Departmental works, other contractors or sub-contractors at the site. In case of any interference, necessary co-ordination shall be sought by the contractor from the Department for safe and smooth working.
- 2.5 The Contractor and his sub-contractor, if any, shall comply with the instructions given by the Safety Engineer or his authorised nominee regarding safety precautions, protective measures, house keeping requirements, etc. The Safety Engineer with due intimation to Engineer-In-charge shall have the right to stop the work of the contractor, if in his opinion proceeding with the work will lead to an unsafe and dangerous condition. Engineer-in-charge shall get the unsafe

conditions removed or provide protective equipment at the contractors cost. The contractor can employ his own Safety Engineer or nominate one of his officers for liaison with Departmental Safety Engineer, for ensuring compliance of all safety rules. Contractor shall ensure that, all his workmen are aware about the nature of risk involved in their work and have adequate training for carrying out their work safely.

- 2.6 The Contractor shall be held responsible for non-compliance of any of the safety measures and delays, implications, injuries, fatalities and compensation arising out of such situations or incidents.

3. TRAFFIC

- 3.1 The Contractor shall conduct his operations so as to interfere as little as possible, with the use of existing roads at or near locations where the work is being performed.
- 3.2 When interference to traffic is inevitable, notice of such interference shall be given to the Engineer-in-charge well in advance (at least 48 hours) with the details of start of the work and time required, storage of materials, and details of the proposed methods of providing the required facilities for safe and continuous use of roads and obtain his clearance.
- 3.3 The Contractor shall, at his own expense, make such approved temporary provisions as are required to maintain at least one lane of traffic by bridging the excavation, providing ramps over surface obstructions or providing suitable temporary bye-pass around the obstructions. The Contractor shall exercise full care to ensure that no damage is caused by him or his workmen, during the operation, to the existing water supply, sewage, power or telecommunication lines or any other service or works. The Contractor shall be required to provide and erect before construction, substantial barricades, guard-rails and warning signs. He shall furnish, place and maintain adequate warning lights, signals, etc., as required by Engineer-in-charge.

4. SAFE MEANS OF ACCESS

- 4.1 Adequate and safe means of access and exit shall be provided for all work places, at all elevations. Using of scaffolding members (avoiding a ladder) for approach to high elevations shall not be permitted.
- 4.2 Suitable scaffolds shall be provided for workmen for all works that cannot safely be done from the ground, or from solid construction except such short duration work as can be done safely from ladders. Ladder shall be of rigid construction having sufficient strength for the intended loads and made either of good quality wood or metal and all ladders shall be maintained well for safe working condition. An extra mazdoor shall be engaged for holding the ladder, if ladder is not securely fixed. If

the ladder is used for carrying materials as well, suitable foot holds and hand holds shall be provided on the ladder. The ladder shall be given an inclination not steeper than 1 in 4 (1 horizontal and 4 vertical). Ladders shall not be used for climbing carrying materials in hands. While climbing, both the hands shall be free.

- 4.3 Scaffolding or staging more than 3.5 m above the ground or floor, swung or suspended from an overhead support or erected with stationary support shall have a standard guard rail properly attached, bolted, braced or otherwise secured at least 1.0m high above the floor or platform of such scaffolding or staging. The guard rail shall extend along the entire exposed length of the scaffolding with only such opening, as may be necessary for the delivery of materials. Standard railing shall have posts not more than 2m apart and an intermediate rail halfway between the floor or platform of the scaffolding and the top rail. Such scaffolding or staging shall be so fastened as to prevent it from swaying from the building or structure. Scaffolding and ladder shall conform to relevant IS Specification (IS 3696-1966). Timber / Bamboo scaffolding shall not be used.
- 4.4 Working platforms of scaffolds shall have toe boards at least 15 cm in height to prevent materials from falling down.
- 4.5 A sketch of the scaffolding proposed to be used shall be prepared and approval of the Engineer-in-charge obtained prior to start of erection of scaffolding. All scaffolds shall be examined by Engineer-in-charge, before use.
- 4.6 Working platform, gangways and stairways shall be so constructed that they shall not sag unduly or unequally and if the height of the platform or gangway or stairway is more than 3.5m above ground level or floor level, they shall be closely boarded, shall have adequate width for easy movement of persons and materials and shall be suitably guarded as described in 3.3 above.
- 4.7 The planks used for working platform shall not project beyond the end supports to a distance exceeding four times the thickness of the planks used. The planks shall be rigidly tied at both ends to prevent sliding and slippage. The thickness of the planks shall be adequate to take load of men and materials and shall not collapse.
- 4.8 Every opening in the floor of a building or in a working platform shall be provided with suitable means to prevent fall of persons or materials by providing suitable fencing or railing, the minimum height of which shall be 1.0 m, along with 15 cm high sheet obstruction at floor level along the railing.
- 4.9 Safe means of access shall be provided to all working platforms and other elevated working places. Every ladder shall be securely fixed. No single portable ladder shall be over 9m in length. For ladders upto 3m in length the width between side rails in the ladder shall in no case be less than 300 mm. For longer ladders this width shall be increased by at least 20mm for each additional meter of length. Step spacing shall be uniform and shall not exceed 300 mm.

- 4.10 Adequate precautions shall be taken to prevent danger from electrical lines and equipment. No scaffolding, ladder, working platform, gangway runs, etc. shall exist within 3 meters of any uninsulated electric wire. Whenever electric power and lighting cables are required to run through (pass on) the scaffolding or electrical equipments are used, such scaffolding structures shall have minimum two earth connections with earth continuity conforming to IS code of practice.

5. EXCAVATION, TRENCHING AND EARTH REMOVAL

- 5.1 All trenches 1.2 m or more in depth shall at all times be supplied with at least one ladder for each spacing of 30m in length or fraction thereof. Ladder shall be extended from bottom of the trench to at least 1 m above the surface of the ground.
- 5.2 The sides of the trench which are 1.2 m or more in depth shall be stepped back to give suitable slope (angle of repose) or securely held by timber bracing, so as to avoid the danger of sides from collapsing. The excavated material shall not be placed within 1.5 m of the edges of the trench or half of the depth of the trench, whichever is more. Cutting shall be done from top to bottom. Under no circumstances mining or under-cutting shall be done.
- 5.3 The Contractor shall ensure the stability and safety of the excavation, adjacent structures, services and the works.
- 5.4 Open excavations shall be fenced off by suitable railing and warning signals installed at night at well lit places so as to prevent persons slipping or falling into the excavations.
- 5.5 All blasting operations shall be carried out on the basis of procedures approved by Inspector of Explosives. All works in this connection shall be carried out as per IS Code of Practice. Barricades, warning signals, etc. shall be placed on the roads / open area. Prior approval of such operation shall be obtained from Safety Engineer / Engineer-In-Charge of works.
- 5.6
- a. For removal of earth from an earth mound, a written permission shall be obtained from the Engineer-in-charge of the work and the Engineer-in-Charge of the earth mound.
 - b. As far as practical, earth shall be removed mechanically.
 - c. Wherever manual removal of earth is involved, earth shall be removed from the top by maintaining the proper slope equal to the angle of repose of the earth.

- d. Such work shall be constantly supervised by the contractor's responsible person and frequently inspected by the departmental representative to ensure that no under-cutting is done.

6. CONCRETING

Shuttering and supporting structures shall be of adequate strength and approved by Engineer-in-charge . This shall be ensured before concrete is poured. The procedure approved by Engineer-in-charge shall be followed for mixing, transporting and pouring of concrete.

7. DEMOLITION

Before any demolition work is commenced and also during the progress of the work :

- a. All roads and open area adjacent to the work site shall either be closed or suitably protected. Appropriate warning signs shall be displayed for cautioning approaching persons.
- b. Before demolition operations begin, the Contractor shall ensure that the power on all electric service lines is shut off and the lines cut or disconnected at or outside the demolition site. If it is necessary to maintain electric power during demolition operation, the required service lines shall be adequately protected against damage. Persons handling heavy materials / equipments shall wear safety shoes.
- c. No floor, roof or other part of the building shall be overloaded with debris or materials as to render it unsafe.
- d. Entries to the demolition area shall be restricted to authorised persons only.

8. PERSONAL PROTECTIVE EQUIPMENT

All necessary personal protective equipment as considered necessary by the Engineer-in-Charge shall be kept available by contractor for the use of the persons employed on the site and maintained in a condition suitable for immediate use. Also the contractor shall take adequate steps to ensure proper use of equipment by those concerned. The personal protective equipments are to be provided by the contractor.

- a. All persons employed at the construction site shall use safety helmets. For other types of works, persons working in that area shall also use safety helmets, if advised by Safety Engineer / Engineer-in-charge.

- b. Workers employed on mixing asphaltic materials, cement and lime mortars shall use protective goggles, protective foot wear and hand gloves. Use of proper respirators shall be an advantage.
- c. Persons engaged in welding and gas-cutting works shall use suitable welding face shields. Persons who assist the welders shall use suitable goggles. Protective goggles shall be worn while chipping and grinding.
- d. Stone breakers shall use protective goggles. They shall be seated at sufficiently safe intervals of distance.
- e. Persons engaged in or assisting in shot blasting operations and cleaning the blasting chamber shall use suitable gauntlets, overalls, dust-proof goggles, boots and protective hood supplied with fresh air at the minimum rate of 9m³/hr.
- f. All persons working at heights more than 4.5 m above ground or floor and exposed to risk of falling down, shall use safety belts, unless otherwise protected by cages, guard railings, etc. In places where the use of safety belts is impractical, suitable net of adequate strength fastened to substantial supports shall be employed.
- g. All powered two-wheeler motorcycle and scooter drivers and their pillion riders shall wear crash helmets inside the Project / Plant sites.
- h. When workers are employed in sewers and inside manholes which are in use, the contractor shall ensure that the manholes are opened and are adequately ventilated at least for an hour. After it has been well-ventilated, the atmosphere inside the space shall be checked for the presence of any toxic gas or oxygen deficiency and recorded in the register before the workers are allowed to get into the manholes. The manholes opened shall be cordoned off with suitable railing and provided with warning signals or caution boards to prevent accidents. There shall be proper illumination in the night.

9. PAINTING

- 9.1 The Contractor shall not employ women on the work of painting with products containing lead in any form. Only men above the age of 18 years shall be employed on the work with lead paint. The following precautions shall be taken during the work.
 - Supplied air respirators shall be provided for use by the workers when paint is applied in the form of spray, or a surface having lead paint is dry rubbed or scraped.

- Overalls shall be supplied by the Contractors to the workmen and adequate facilities shall be provided to enable the painters to wash at the cessation of work.
- All painting jobs, especially those in which lead paints are used shall be kept under industrial hygiene surveillance.

9.2 Smoking, open flames or sources of ignition shall not be allowed in places where paints and other flammable substances are stored, mixed or used. A caution board, with the instruction written in national / regional language, "SMOKING - STRICTLY PROHIBITED" shall be displayed in the vicinity where painting is in progress or where paints are stored. Symbols shall also be used for caution boards.

Suitable fire extinguishers / sand buckets shall be kept available at places where flammable paints are stored, handled or used.

When painting work is done in a closed room or in a confined space, adequate ventilation shall be provided. If adequate ventilation cannot be provided, workers shall wear suitable respirators.

9.3 Epoxy resins and their formulations used for painting shall not be allowed to come in contact with the skin. The workers shall use plastic gloves and / or suitable barrier creams.

Adequate ventilation shall be provided especially when working with hot resin mixes.

Increased personal hygiene shall be practiced to control inadvertent contact with the resin and eliminate its effects.

Workers shall thoroughly wash hands and feet before leaving the work. Work clothes shall be changed and laundered frequently.

10. LIFTING MACHINES AND TACKES

10.1 Use of lifting machines and tackles, including their attachments, anchorage and supports shall conform to the following standards or conditions.

- a. Lifting machines and tackles shall be of good mechanical construction, sound material and adequate strength and free from any defects and shall be kept in good repair and in good working order.

Every rope used in hoisting or lowering materials or as a means of suspension shall be of good quality and adequate strength and free from any defect.

- b. Every crane operator or lifting appliance operator shall be properly qualified. No person under the age of 21 years shall be in charge of any hoisting machine or give signal to operator of such machine.
- c. In case of every lifting machine (and of every chain, ring, hook, shackle, swivel and pulley block used in hoisting or as means of suspension) the safe working load shall be ascertained and clearly marked. In case of a lifting machine having a variable safe working load, each safe working load and the conditions under which it is applicable, shall be clearly indicated. No part of any machine or any gear referred to above in this paragraph shall be loaded beyond the safe working load except for the purpose of testing. This shall be approved by the Safety Engineer.
- d. In case of departmental machines, the safe working load shall be notified by the Engineer-in-charge. As regards Contractor's machines, the contractor shall notify the safe working load of the machine to the Engineer-in-charge whenever he brings any machinery to site of work and get it verified by the Engineer-in-charge, supported by a valid test certificate by the competent person.
- e. Thorough inspection and load testing of lifting machines and tackles shall be done by a competent person at least once every 12 months and records of such inspection and testing shall be maintained.

10.2 Motors, gearing transmission, couplings, belts, chain drives and other moving parts of hoisting appliances shall be provided with adequate safeguards. Hoisting appliances shall be provided with such means as will reduce to the minimum the risk of any part of a suspended load becoming accidentally displaced or lowered.

11. WELDING AND GAS CUTTING

- 11.1 Welding and gas cutting operations shall be done only by qualified and authorised persons and as per IS Specification and Code of Practice.
- 11.2 Welding and gas cutting shall not be carried out in places where flammable or combustible materials are kept and where there is danger of explosion due to presence of gaseous mixtures.
- 11.3 Welding and gas cutting equipment including hoses and cables shall be maintained in good condition.
- 11.4 Barriers shall be erected to protect other persons from harmful rays from the work. When welding or gas cutting is done in elevated positions, precautions shall be taken to prevent sparks or hot metal falling on persons or flammable materials.

- 11.5 Suitable type of protective clothing consisting of fire resistant gauntlet gloves, leggings, boots and aprons shall be provided to workers as protection from heat and hot metal splashes. Welding shields with filter glasses of appropriate shade shall be worn as face protection.
- 11.6 Adequate ventilation shall be provided while welding in confined space or while brazing, cutting or welding zinc, brass, bronze, galvanised or lead coated materials.
- 11.7 Welding and gas cutting shall not be done on drums, barrels, tanks or other containers unless they have been emptied, cleaned thoroughly and it is made certain that no flammable material is present.
- 11.8 Fire extinguisher shall be available near the location of welding operations. Fire Safety Permit shall be obtained for working at vulnerable areas and operating areas before flame cutting/welding is taken up.
- 11.9 For electric (Arc) welding the following additional safety precautions shall be taken:
- i) When electrical welding is undertaken near pipe lines carrying flammables, such pipe lines shall not be used as part of earth conductor but a separate earth conductor shall be connected to the machine directly from the job.
 - ii) Personnel contact with the electrode or other live parts of electric welding equipment shall be avoided.
 - iii) Extreme caution shall be exercised to prevent accidental contact of electrodes with ground.
 - iv) The welding cables shall not be allowed to get entangled with power cables. It shall be ensured that the cables are not damaged by movement of materials.

12. GRINDING

- 12.1 All portable grinders shall be used only with their wheel guards in position to reduce the danger from flying fragments should the wheel break during the use.
- 12.2 Grinding wheels of specified diameter only shall be used on a grinder - portable or pedestal - in order not to exceed the prescribed peripheral speed.
- 12.3 Goggles shall be used during grinding operation.

13. ELECTRICITY

Guidelines for providing temporary power supply at the site and general safety procedures for using electricity are given in the enclosed Annexure.

14. HOUSEKEEPING

- 14.1 The Contractor shall at all times keep his work spot, site office and surroundings clean and tidy from rubbish, scrap, surplus materials and unwanted tools and equipment.
- 14.2 Welding and other electrical cables shall be so routed as to allow safe traffic by all concerned.
- 14.3 No materials on any of the sites of work shall be so stacked or placed as to cause danger or inconvenience to any person or the public. The Engineer-In-Charge may require the Contractor to remove any materials which are considered to be of danger or cause inconvenience to the public. If necessary, the Engineer-In-Charge may cause them to be removed at the Contractor's cost.
- 14.4 At the completion of the work, the Contractor shall have removed from the work premises all scaffoldings, surplus materials, rubbish and all huts and sanitary arrangements used/installed for his workmen on the site.
- 14.5 The Engineer-In-Charge has the right to stop work if the Contractor fails to improve upon the housekeeping after having been notified.

15. FIRE SAFETY

All necessary precautions shall be taken to prevent outbreak of fires at the construction site. Adequate provisions shall be made to extinguish fires should they still break out.

- a) Quantities of combustible materials like timber, bamboos, coal, paints, etc., shall be the minimum required in order to avoid unnecessary accumulation of combustibles at site.
- b) Containers of paints, thinners and allied materials shall be stored in a separate room which shall be well ventilated and free from excessive heat, sparks, flame or direct rays of the sun. The containers of paint shall be kept covered or properly fitted with lid and shall not be kept open except while using.
- c) Fire extinguishers as approved by the Engineer-In-Charge shall be located at the construction site at appropriate places.

- d) Adequate number of contract workmen shall be given education and training in fire fighting and extinguishing methods.

16. SAFETY WORK PERMIT

- 16.1 In order to ensure safety of work for hazardous operation (such as entry into confined spaces, welding/cutting on equipment/pipes where explosion hazard is present, works on high voltage and main medium voltage lines, blasting etc.) special Safety Work Permits (SWP) shall be raised. The SWP's shall also to be obtained for any other work as recommended by Safety Engineer.
- 16.2 The Contractor shall strictly ensure all the safety conditions and requirements stipulated in the Safety Work Permit. The decision of the Safety Engineer shall be final in this regard.

17. WORK IN RADIATION AREA

The Contractor shall follow the stipulated procedure regarding work in the radiation area and other works related with radiography.

18. WORK IN AND AROUND WATER BODIES

When the work is done near any place where there is risk of drowning, all necessary rescue equipment such as life buoys and life jackets shall be provided and kept ready for use and all necessary steps taken for prompt rescue of any person in danger and adequate provision shall be made for prompt first-aid treatment of all injuries likely to be sustained during the course of the work. Persons who do not know swimming shall not be engaged alone for any work where risk of drowning exists. Sufficient number of life buoys or life jackets shall be provided.

19. MEDICAL FACILITIES

- 19.1 The Contractor shall arrange adequate facilities for medical aid and treatment for his staff and workers engaged on the work site including the first-aid facilities if they are not available at the project site.
- 19.2 First-aid appliances including sterilized dressing, cotton wool and antiseptic cream shall be made available at a readily accessible places at every work site. These shall be maintained in good order under the charge of a responsible person.
- 19.3 At large work places where hospital facilities are not available within easy reach of the works, first-aid posts shall be established and be manned by a trained compounder. An ambulance shall be available during the entire period of work for attending to injury cases.

20. SAFETY OFFICER / SAFETY COORDINATOR

The Contractor shall have a Safety Officer or a supervisor to be designated as a Safety Coordinator in order to specifically look into the implementation of different safety requirements of the contract work. The person thus designated will in general co-ordinate with the Engineer-In-Charge on matters of safety and in particular ensure that the Safety Guide is complied with fully. His name shall be displayed on the Notice Board at a prominent place at the work site.

21. REPORTING OF ACCIDENT

- 21.1 All accidents leading to property damage and/or personnel injuries shall be reported to the Engineer-In-Charge immediately who shall inform SARCOP to be followed up with detailed accident reports in prescribed form.
- 21.2 Contractor shall also submit a monthly statement of accidents to Engineer-In-Charge by 4th of every month showing details of accident, nature of injury including disability, days lost, treatment required, etc. and the extent of property damage.

22. PUBLIC PROTECTION

The Contractor shall make all necessary provisions to protect the public. He shall be bound to bear the expenses for defense of every action or other proceedings at law that may be brought by any person for injury sustained owing to neglect of any precaution required to be taken to protect the public. He shall pay any damage and cost which may be awarded in any such suit, action or proceedings to any such person, or the amount which may be fixed as a compromise by any such person.

23. OTHER STATUTORY PROVISIONS

Notwithstanding the above clauses from 1 to 21 there is nothing in these to exempt the Contractor from the provisions of any other Act or Rules in force in the Republic of India. In particular, all operations involving the transport, handling, storage and use of explosives shall be as per the standing instructions and conform with the Indian Explosives Act, 1884 and the Explosives Rules, 1983. Handling, transport, storage and use of compressed gas cylinders and pressure vessels shall conform with the Gas Cylinder Rules, 1981 and Static and Mobile Pressure Vessels (Unfired) Rules, 1981. In addition, the Indian Electricity Act, 1910 and Indian Electricity Rules, 1956, the Atomic Energy Act, 1962, the Radiation Protection Rules, 1971, Radiation Protection Manual of Nuclear Facilities and the Atomic Energy (Factories) Rules, 1988 and various Rules and Act related to mining shall also be strictly complied with.

GUIDELINES AND GENERAL PROCEDURES FOR SUPPLY AND USE OF ELECTRICITY AT SITE

1. GENERAL

Following safety requirements shall be complied with before the Contractor uses the power supply.

1.1 The Contractor shall submit a list of licensed electrical staff to be posted at site.

1.2 It shall be the responsibility of the Contractor to provide and maintain complete installation on the load side of the supply point with regard to the safety requirements at site. All cabling and installation shall comply with the appropriate statutory requirements given below and shall be subject to approval of the Departmental Engineer-In-Charge/Electrical Engineer.

- a) Indian Electricity Act, 1910
- b) Electricity (Supply) Act, 1948
- c) Indian Electricity Rules, 1956
- d) National Electric Code, 1985
- e) Other relevant rules of Local Bodies and Electricity Boards

After installation of the electrical power wiring works by the Contractor, form of completion certificate as per IS 732 (Form SGCW - 1) shall be submitted by the Contractor duly signed by the authorised valid licensed electrical Contractor and/or supervisor along with one copy of the Contractor's license and/or competency certificate of supervisor issued by the Electricity Board/Government Electricity Organisations as per the enclosure.

The power supply shall be regulated as per the terms and conditions of the supply of the respective Electricity Boards.

1.3 (a) For purposes of electrical load and power planning by the electrical section, the contractor shall furnish along with the tender, the estimated load requirement of electric power for the execution of the contract works in terms of maximum Kilo Watt or KVA demand during various periods/months of the contract period along with the details of the construction electrical equipment/machinery with their individual load details and location/locations of power supply required for availing temporary electric power supply in the standard proforma enclosed (Form SGCW - 2)

- (b) The electric power supply will be generally made available at one point in the works site of the contractor by the department.
 - (c) Where distribution boards are located at different places the Contractor shall submit schematic drawing indicating all details like size of wires, overhead or cable feeders, earthing, etc. The position and location of all equipment and switches shall be given.
- 1.4 The Contractor shall make his own arrangements for main earth electrode and tapping thereof. The existing earth points available at site can be used at the discretion of the Departmental Electrical Engineer with prior permission. Method of earthing, installation and earth testing results shall conform to relevant I.S. specifications (IS-3043).
- 1.5 All three phase equipment shall be provided with double earthing. All light fixtures and portable equipment shall be effectively earthed to main earthing.
- 1.6 All earth terminals shall be visible. No gas pipes and water pipes shall be used for earth connection. Natural conductor shall not be treated as earth wire.
- 1.7 The Contractor shall not connect any additional load without prior permission of Departmental Electrical Engineer. For obtaining additional power required, test reports of the tests mentioned in (d) of Form SGCW - 1 shall be submitted.
- 1.8 Joints in earthing conductors shall be avoided. Loop earthing of equipment shall not be allowed. However tapplings from an earth bus may be done.
- 1.9 The entire installation shall be subjected to the following tests before energisation of installation including portable equipment :
- a) Insulation resistance test
 - b) Polarity test of switches
 - c) Earth continuity test
 - d) Earth electrode resistance
- The test procedures and their results shall conform to relevant IS specifications. The Contractor shall submit a test report for his complete installation every 2 months or after rectifying any fault section in the specimen test report. One such test report for the complete installation shall be submitted before onset of monsoon.

2. The following are provided for general guidance of the Contractor and shall be read a specific requirement, in addition to complying with Indian Electricity Act, Indian Electricity Rules and IS specifications.

2.1 **INSTALLATION**

- a) Only persons having valid wireman's license/competency certificate shall be employed for carrying out electrical work and repair of electrical equipment, installation and maintenance at site. The job shall be supervised by a qualified licensed supervisor.
- b) Electrical equipment and installations shall be installed and maintained as to prevent danger from contact with live conductors and to prevent fires originating from electrical causes like short circuits, overheating, etc. Installation shall not cause any hindrance to movement of men and materials.
- c) Materials for all electrical equipment shall be selected with regard to working voltage, load and working environment. Such equipment shall conform to the relevant standards.
- d) The minimum clearance to be maintained for all overhead lines along roads and across roads shall be as per the statutory requirements as listed in Clause 1.2 of the Annexure.
- e) Grounding conductor of wiring system shall be of copper or other corrosion-resistant material. An extra grounding connection shall be made in appliances/equipment where chances of electric shock is high.
- f) Electric fuses and/or circuit breakers installed in equipment circuits for short circuit protection shall be of proper rating. It is also recommended that high rupturing capacity (HRC) fuses be used in all circuits. For load of 5 KW or more earth leakage circuit breaker shall be provided in the circuits.
- g) Wherever cables or wires are laid on poles, a guard wire of adequate size shall be run along the cables/wires and earthed effectively. Metallic poles as a general rule, shall be avoided and if used shall be earthed individually. Anticlimbing guards and danger notices shall be provided on poles. Each equipment shall have individual isolating switches.

- h) Wires and cables shall be properly supported and an approved method of fixing shall be adopted. Loose hanging of wires & cables shall be avoided. Lighting and power circuits shall be kept distinct and separate.
- i) Reinforcement rods or any metallic part of structure shall not be used for supporting wires and cables, fixtures, equipment, earthing, etc.
- j) All cables and wires shall be adequately protected mechanically against damages. In case the cable is required to be laid under ground, it shall be adequately protected by covering the same with bricks, plain cement concrete (PCC) tile or any other approved means.
- k) All armoured cables shall be properly terminated by using suitable cable glands. Multi-stranded conductor cables shall be connected by using cable lugs/sockets. Cable lugs shall preferably be crimped. They shall be of proper size and shall correspond to the current rating and size of the cable. Twisted connections will not be allowed.
- l) All cable glands, amouring and sheathing of electric cables, metal circuits and their fittings, metallic fittings and other non-current carrying parts of electrical equipment and apparatus shall be effectively grounded.
- m) All the Distribution Boards, switch fuse units, bus bar chambers, ducts, cubicles, etc. shall have MS enclosures and shall be dust, vermin and water proof. The Distribution Boards, switches, etc., shall be so fixed that they shall be easily accessible. Changes shall be done only after the approval of the Departmental Electrical Engineer.
- n) The Contractor shall provide proper enclosures/covers of approved size and shape for protection of all the switch board, equipment, etc. against rain. Exposed live parts of all electrical circuits & equipment shall be enclosed permanently. Crane trolley wires and other conductors which cannot be completely insulated shall be placed such that they are inaccessible under normal working conditions.
- o) Iron clad industrial type plug outlets are preferred for additional safety.

- p) Open type Distribution Boards shall be placed only in dry and ventilated rooms; they shall not be placed in the vicinity of storage batteries or otherwise exposed to chemical fumes.
- q) Isolating switches shall be provided close to equipment for easy disconnection of electrical equipment or conductors from the source of supply when repair or maintenance work has to be done on them.
- r) In front of distribution boards a clear space of 90 cm shall be maintained in order to have easy access during an emergency.
- s) Adequate working space shall be provided around electrical equipment which require adjustment or examination during operation.
- t) As far as possible electrical switches shall be excluded from a place where there is danger of explosion. All electrical equipment such as motors, switches and lighting fittings installed in work room where there is possibility of explosion hazard shall be explosion proof.
- u) All connections to lighting fixtures, starters or other power supplies shall be provided with PVC insulated, PVC sheathed twin/three/four core wires to have better mechanical protection for preventing possible damage to equipment or injury to personnel. Taped joints shall not be allowed and the connections may be made in looping system. Electric starter of motors, switches shall not be mounted on wooden boards. Only sheet steel mounting or iron frame work shall be used.
- v) All the lighting fixtures and lamp holders shall be of good quality and in good condition. Badly repaired or broken holders, etc. shall not be used.
- w) Only PVC insulated and PVC sheathed wires or armoured PVC insulated and sheathed cables shall be used for external power supply connections of temporary nature. Whether proof rubber wires shall not be used for any temporary power supply connections. Taped joints in the wires shall not be used.
- x) The bulbs/lamps used for illumination and testing purpose shall have cover or guard to protect them from accidental breakages. Only 24 V supply system

shall be used for hand lamps etc. while working inside metallic tanks or conducting vessels.

- y) After installation of new electric system and or other extensive alterations to existing installations, thorough inspection shall be made by Departmental Electrical Engineer before the new system or new extension is put in use.
- z) Contractor shall ensure that power factor for their loads shall be maintained at 0.85. In case the power factor falls below 0.85, necessary capacitor units shall be provided by the contractor.

2.2 OPERATION & MAINTENANCE

- a) All persons who work with electrical installation/equipment shall be aware of the electrical hazards, use of protective devices and safe operational procedures. They shall be given training in fire fighting, first aid and artificial resuscitation techniques.
- b) The supervisor shall instruct the workers in the proper procedure, specify and enforce the use of necessary protective equipment such as adequately insulated pliers, screw drivers, fuse pullers, testing lamps and similar hand tools. Only wooden ladders shall be used to reach the heights in electrical work.
- c) No material or earth work shall be allowed to be dumped below or in the vicinity of the bare overhead line conductors.
- d) Separate work permits shall be issued for individual group leaders working on the same system which shall be returned after the completion of the work to Safety Supervisor and no system shall be energised without the clearance of Safety Supervisor.
- e) Before any maintenance work is commenced on electrical installations/equipment, the circuits shall be de-energised and ascertained to be dead by positive test with an approved voltage testing device. Switches shall be tagged or the fuse holders withdrawn before starting the work. Adequate precautions shall be taken in two important aspects viz.
 - i) That there shall be no danger from any adjacent live parts and
 - ii) That there shall be no changes of re-energisation of the equipments on which the persons are working.

- f) While working on or near a circuit, whenever possible the use of one hand may be practiced even though the circuit is supposed to be dead. The other hand may preferably be kept in pocket.
- g) When it is necessary to touch electrical equipment (for example when checking for overload of motors) back of the hand may be used. Thus, if accidental shock were to cause muscular contractions, one would not 'freeze' to the conductor.
- h) Operation of electrical equipment shall be avoided when standing on wet floor or when hands are wet.
- i) Before blown fuses are replaced, the circuit shall be locked out and an investigation shall be made for the cause of the short circuit or overload.
- j) When two persons are working within reach of each other, they shall never work on different phases of the supply.
- k) When structural repairs, modification or painting work are to be undertaken, appropriate measures shall be taken for the protection of persons whose work may bring them into the proximity of live equipment/circuit.
- l) It shall be ensured that the insulation and wire size of extension cords are adequate for the voltage and current to be carried.
- m) While tapping electricity from the socket, plug top must be used. It shall be ensured that no extension boards are over loaded while tapping. Only standard three pin plugs shall be used for tapping electricity. Broken sockets/plugs shall be replaced immediately with good ones. Only joint free cables shall be used for connecting equipment/apparatus.
- n) Floors shall be kept free from trailing electrical cables to avoid tripping hazard.
- o) Power supply to all the machines and lighting fixture shall be switched off when not in use.
- p) Temporary electrical connections shall be removed as soon as the stipulated work is over. After completion of the works, the Contractor shall dismantle the distribution boards and the other facilities he may have erected.
- q) Unauthorised tapping of power by others from distribution boards under the control of the contractor shall be prohibited at all circumstances.
- r) No flammable materials shall be stored in any working area near the switch boards.
- s) Safety work permits shall be used for switching off the main feeder and equipment by the contractor.

- t) "MAN ON LINE" "DO NOT SWITCH ON" "DANGER" or "CAUTION" board as applicable shall be used during maintenance works on the electrical equipment.

2.3 PORTABLE ELECTRICAL EQUIPMENT

- a) Portable electrical equipment shall be regularly examined, tested and maintained to ensure that the equipment and its leads are in good order. Register shall be maintained for inspection recording the testing dates and results of the equipments.
- b) All portable appliances shall be provided with three core cable and three pin plug. The third pin of the plug shall invariably be earthed. It shall be ensured that the metal part of the equipment shall be effectively earthed.
- c) All connections to portable equipment or machines from the panel/distribution board/extension board shall be taken using 3 core double insulated PVC flexible copper wire in one length. No joints shall be allowed in this flexible wire. In case single length of wire is not sufficient for a particular location then the supply can be tapped by providing another extension board comprising of switch and socket.
- d) Flexible cables for portable lamps, tools and apparatus shall be regularly examined, tested periodically and maintained to ensure safety.

FORM NO.SGCW - 1

FORM FOR COMPLETION CERTIFICATE

(Prescribed under Cl. 1.2 of Annexure)

I/We certify tht the installation detailed below has been installed by me/us and tested and that to the best of my/our knowledge and belief, it complies with Indian Electricity Rules, 1956 as well as IS:732-1963 code of practice for Electrical Wiring Installations. (System voltage not exceeding 650 Volts (Revised)).

Electrical installation at

Voltage and system of supply

a)	Particulars of work	Number	Total load	Type of system of wiring
		-----	-----	-----

- | | |
|------|---------------------|
| i) | Light points |
| ii) | Fan points |
| iii) | Plug points (3 pin) |
| iv) | Motors |

b) If the work involves installation of overhead lines and/or underground cable

c) Earthing

Description of earthing electrode, size of earth wire and number of electrodes provided :

d) Test results

1. Insulation resistance for the whole installation :

- | | |
|-----|----------------------------------|
| i) | Between conductors |
| ii) | Between each conductor and earth |

2. Resistance of earthing electrode or earthing system.

3. Maximum earthing resistance of installation _____

Signature of Supervisor

Signature of Contractor

Name and address of Supervisor

Name and address of Contractor

'A' APPLICATION FOR SERVICE CONNECTION BY CONTRACTOR

(Prescribed under Cl. 1.3 of Annexure)

(To be filled in triplicate)

1. Name and Address of Contractor :
2. Reference to Tender & Work Order :
3. Completion period :
4. Connected load details (please attach details :
in a separate sheet)
5. Max. demand anticipated :
6. Nature of service connection required :
(whether single or three phase)
7. Place where service required :
 - a) Works :
 - b) Colony :
8. If supply of electricity is free or chargeable :
(Please enclose extract of conditions from
the tender)
9. Details of meter provided :
 - a) If meter required from the Department, :
whether SD is paid
 - b) Details of SD (Security Deposit) :
 - c) Whether meter is tested or not, if tested, :
attach test report, if not, details of testing
fee deposited
10. Name of Supervisor/Electrician in charge :
of installation and maintenance
11. Electrical license No. of person mentioned :
Against Col. 10

- 12. Electrical safety appliances available for use :
- 13. Fire extinguishers available for use :
- 14. First Aid facility/box available for use, if any. :

(Signature of the Contractor)

Date : Name :

'B' CERTIFICATE BY THE CONTRACTOR

Certified that my/our installations have been carried out in accordance with I.E. Rules and that I/we have employed competent persons to handle the installations.

I/We am/are agreeable to the bills, in respect of this service connections being raised on the basis the connected load furnished above, in case the actual consumption falls below the one stipulated by the tender conditions.

(Signature of the Contractor)

Name :

Address :

Date :

.....

'C' CERTIFICATE BY THE CONTRACT CONTROL ENGINEER

Verified the particulars and forwarded to the Engineer-In-Charge.

(Signature of Contract Control Engineer)

Name :

Section : Civil/Electrical/Mechanical

.....

'D' CERTIFICATE BY THE ENGINEER-IN-CHARGE

Certified that the particulars furnished by the Contractor are true to the best of my knowledge and belief and that I have satisfied myself as to the safe conditions of electrical installations for which the service connection is applied for.

Signature :

Name :

Designation with Section :

Date:

'E' CERTIFICATE BY THE SAFETY ENGINEER

Certified that I have inspected the electrical installations referred herein and after satisfying myself about the safe conditions of the installation, I hereby recommend that the service connection be given to the Contractor.

Signature of the Safety Engineer

Date :

Name :

.....

'F' AUTHORISATION BY THE ELECTRICAL ENGINEER

Service connection may be/may not be given for the reasons noted hereunder :

Signature of Electrical Engineer :

Name :

Date:

Designation :

.....

'G' REPORT OF COMPLIANCE

Service connection is given by me on

- a) Meter Nos. :

1.

2.

3.
- b) Initial readings :

1.

2.

3.
- c) Locations :

1.

2.

3.

d) Meter sealings :

Signature of Electrical Engineer

(Metering and Billing)

Name :

Date :

Designation :

Note:

- 1st copy to Contract Control Engineer

2nd copy to Safety Engineer

3rd copy to Electrical Engineer

} After all the formalities are completed

} and Report of Compliance in (G) are

} filled up by the electrical Engineer after

} power supply is given.

}

22. TENDER FORMS

TENDER

To,
Nuclear Power Corporation of India Ltd.,
(Hereinafter referred to as the Corporation)

I/We have read and examined the following documents relating to _____

(Name of the Works)

- (a) Notice Inviting tender.
- (b) Schedules A, B & C
- (c) Technical Specifications
- (d) Drawings
- (e) General Conditions of Contract including Contractors Labour Regulations, Model Rules for Labour Welfare and Safety guide appended to these conditions together with the amendments thereto Nos. 1 to if any.
- (f) Special Conditions of contracts
- (g) Schedule of quantities and Rates (referred to in the General Conditions of Contract as Schedule of Rates) together with Amendment Nos. 1 to if any.

I/We hereby tender for execution of the works referred to in the aforesaid documents upon the terms and conditions contained or referred to therein and in accordance in all respects with the specifications, designs, drawings and other relevant details at the rates contained in Schedule of Quantities and Rates and within the period(s) of completion as stipulated in NIT.

In consideration of I/We being invited to tender. I/We agree to keep the tender open for acceptance for days from the due date of submission thereof and not to make any modifications in its terms and conditions which are not acceptable to the Corporation.

A sum of Rs is hereby forwarded in Demand Draft payable at/Deposit at Call Receipt of any scheduled commercial bank as Bid Security. If I/We fail to keep the tender open as aforesaid or make any modifications in the terms and conditions of the tender which are not acceptable to the Corporation, I/We agree that the Corporation shall without prejudice to any other right or remedy, be at liberty to forfeit the said bid security absolutely. Should this tender be accepted, I/We hereby agree to abide by and fulfill all the terms, conditions and provisions of the aforesaid documents.

If, After the tender is accepted, I/We fail to commence the execution of the works as provided in the conditions, I/we agree that the Corporation shall without prejudice to any other right or remedy be at liberty forfeit the said bid security absolutely.

Signature of the capacity of _____

Duly authorised to sign the tender on behalf of the

(In block Capitals)_____

Dated _____

Postal Address _____

Telegraph Address _____

Telephone No./Fax/Telex No _____

Seal of the Company/Firm

Witness _____

Date_____

Address _____

23. FORMS OF DIFFERENT DEEDS

1. PROFORMA BANK GUARANTEE IN LIEU OF BID SECURITY

(On Non Judicial Stamp paper to be stamped in accordance
with stamp act, the stamp paper to be in name of
Executing Bank)

Ref.....

Date.....

Bank Guarantee No.....

To **NUCLEAR POWER CORPORATION OF INDIA LTD**

Dear Sir,

In accordance with your Notice Inviting Tender for _____under your
tender No_____ dated _____ M/s _____ (hereinafter
called the Tenderer) with following directors on their Board of Directors/Partners of
the firm.

1_____	2_____
3_____	4_____
5_____	6_____
7_____	8_____
9_____	10_____

Wish to participate in the said tender for the following:

1_____

2_____

3_____

Whereas it is a condition in the tender documents that the tenderer has to deposit Bid Security with respect to the tender, with Nuclear Power Corporation of India Ltd (hereinafter referred to as "Corporation") amounting to Rs..... or alternatively the tenderer is required to submit "Bank Guarantee" from a nationalised bank irrevocable and operative till 28 days after the validity of the offer. (i.e. 120 days from the date of opening of tender), for the like amount which amount is likely to be forfeited on the happening of contingencies mentioned in the tender documents. And whereas the tenderer desires to secure exemption from deposit of Bid Security and has offered to furnish a Bank Guarantee for a sum of Rs..... to the Corporation for the purpose of securing exemption from the deposit of Bid Security.

1. NOW THEREFORE, we the Bank, a body corporate constituted under the Banking Companies (Acquisition and Transfer of undertakings) Act 1969 and having a branch office at..... (hereinafter referred to as the Bank") do hereby undertake and agree to pay on demand in writing by the Corporation, the amount of Rs.....(Rupees.....) to the Nuclear Power Corporation of India Ltd without any demur, reservation or recourse.
2. We, the aforesaid Bank, further agree that the Corporation shall be the sole judge of and as to whether the tenderer has committed any breach or breaches of any of the terms and conditions of the tender and the extent of loss, damage, costs, charges and expenses caused to or suffered by or that may be caused to or suffered by the Corporation on account thereof the extent of the bid security required to be deposited by the Tenderer in respect of the said Tender document and the decision of the Corporation that the Tenderer has committed such breach or breaches and as to the amount or amounts of loss, damage, costs, charges and expenses caused to or suffered by or that may be caused to or suffered by the Corporation shall be final and binding on us.
3. We, the said Bank further agree that the Guarantee herein contained shall remain in full force and effect until it is released by the Corporation and change in the constitution, liquidation or dissolution of the Tenderer, shall not discharge our liability guaranteed herein.
4. It is further declared that it shall not be necessary for the Corporation to proceed against the Contractor before proceeding against the Bank and the Guarantee herein contained shall be enforceable against the Bank notwithstanding any security which the Corporation may have obtained or shall obtain from the Contractor at the time when proceedings are taken against the Bank for whatever amount may be outstanding or unrealised under the Guarantee.
5. The right of the Corporation to recover the said amount of Rs.....(Rupees) from us in manner aforesaid will not be affected or suspended by reason of the fact that any dispute or disputes have been raised by the said

M/s..... (Tenderer) and/or that any dispute or disputes are pending before any authority, officer, tribunal or arbitrator(s) etc.

6. Notwithstanding anything stated above, our liability under this guarantee shall be restricted to Rs.....(Rupees.....) and our guarantee shall remain in force upto..... and unless a demand or claim under the guarantee is made on us in writing within three months after the aforesaid date i.e. on or before the all your rights under the guarantee shall be forfeited and we shall be relieved and discharged from all liabilities thereunder.

Date.....

place.....

(Signature)_____

(Printed Name)_____

(Designation)_____

(Bank's Common seal)_____

(Authorisation No.)_____

In the presence of:

Witness

1)_____

2)_____

Accepted

(Signature of the Officer)
For and on behalf of the
Nuclear Power Corporation
of India Ltd.

**2. PROFORMA OF BANK GUARANTEE IN LIEU OF SECURITY DEPOSIT
(Performance Guarantee / Retention money)
IN INDIVIDUAL CONTRACT
(ON NON JUDICIAL STAMP PAPER)**

To

Nuclear Power Corporation of India Ltd.

In consideration of the Nuclear Power Corporation of India Ltd.....
Atomic Power Project) having its registered Office at
..... (hereinafter called the "Corporation" which expression shall
unless repugnant to the subject or context include its administrators,
successors and assigns) having agreed under the terms and conditions of the
Award Letter bearing No..... dated..... issued by the Corporation, which
has been unequivocally accepted by the Contractor
M/s...*..... work of.....(hereinafter called the
said Contract) to accept a Deed of Guarantee as herein provided for
Rs.....(Rupees.....only) from a Scheduled commercial bank in lieu of the
..... (performance guarantee to be submitted by the Contractor
/retention money deducted from the Contractor's bills) for the due fulfillment by the
said Contractor of the terms and conditions contained in the said Contract.

1. We, the Bank (hereinafter referred to as "the said Bank" and having our
registered office at..... do hereby undertake and agree to indemnify and keep
indemnified the Corporation from time to time to the extent of
Rs.....(RupeesOnly) against any loss or damage, costs, charges and
expenses caused to or suffered by or that may be caused to or suffered by the
Corporation by reason of any breach or breaches by the said Contractor of any
of the terms and conditions contained in the said Contract and to
unconditionally pay the amount claimed by the Corporation on demand and
without demur to the extent aforesaid.
2. We..... Bank, further agree that the Corporation shall be the sole judge
of and as to whether the said Contractor has committed any breach or breaches
of any of the terms and conditions of the said Contract and the extent of loss,
damage, costs, charges and expenses caused to or suffered by or that may be
caused to or suffered by the Corporation on account thereof and the decision
of the corporation that the said Contractor has committed such breach or

*Refer note at the end of the proforma.

breaches and as to the amount or amounts of loss, damage, costs charges and expenses caused to or suffered by or that may be caused to or suffered by the Corporation from time to time shall be final and binding on us.

3. We, the said Bank further agree that the Guarantee herein contained shall remain in full force and effect during the period that would be taken for the performance of the said Contract and till all the dues of the Corporation under the said Contract or by virtue of any of the terms and conditions governing the said Contract have been fully paid and its claims satisfied or discharged and till the owner certifies that the terms and conditions of the said Contract have been fully and properly carried out by the said Contractor and accordingly discharges this Guarantee subject, however, that the Corporation shall have no claim under the Guarantee after 90 (Ninety) days from the date of expiry of the Defects Liability Period as provided in the said Contract, i.e.(date) or from the date of cancellation of the said contract as the case may be, unless a notice of the claim under this Guarantee has been served on the Bank before the expiry of the said period in which case the same shall be enforceable against the Bank notwithstanding the fact, that the same is enforced after the expiry of the said period.

The Corporation shall have the fullest liberty without affecting in any way the liability of the Bank under this Guarantee or Indemnity, from time to time, to vary any of the terms and conditions of the said Contract or to extend time of performance by the said Contractor or to postpone for any time from time to time any of the powers exercisable by it against the said Contractor and either to enforce or forbear from enforcing any of the terms and conditions governing the said Contract or securities available to the Corporation and the said bank shall not be released from its liability under these presents by any exercise by the Corporation of the liberty with reference to the matters aforesaid or by reason of time being given to the said Contractor or any other forbearance act or omission on the part of the Corporation or any indulgence by the Corporation to the said Contractor or any other matter or thing whatsoever which under the law relating to sureties would, but for this provision, have the effect of so releasing the Bank from its such liability.

5. It shall not be necessary for the Corporation to proceed against the Contractor before proceeding against the Bank and the Guarantee herein contained shall be enforceable against the Bank, notwithstanding any security which the Corporation may have obtained or obtain from the Contractor shall at the time when proceedings are taken against the Bank hereunder, be outstanding or unrealised.
6. We, the said Bank, lastly undertake not to revoke this Guarantee during its currency except with the previous consent of the Corporation in writing and agree that any change in the Constitution of the said Contractor or the said Bank shall not discharge our liability hereunder. If any further extension of this

Guarantee is required the same shall be extended to such required periods on receiving instructions from M/s.....on whose behalf this guarantee is issued.

In the presence of

For and on behalf of (the Bank)

WITNESS

1. _____

Signature _____

2. _____

Name & Designation _____

Authorisation No: _____

Date and Place: _____

Bank's Seal _____

Accepted

(Signature of the Officer)
For and on behalf of the
(Nuclear Power Corporation of India Ltd)

NOTES

***For Proprietary Concerns**

Shri _____ son of _____ resident of _____ carrying on business under the name and style of _____ at _____ (herein after called " the said Contractor" which expression shall unless the context requires otherwise include his heirs, executors, administrators and legal representatives.

***For Partnership Concerns**

M/s. _____ a partnership firm with its office _____ (hereinafter called " the said Contractor" which expression shall unless the context requires otherwise include their heirs, executors, administrators and legal representative); the names of their partners being

(i) Shri _____ S/o. _____

(ii) Shri _____ S/o. _____

***For Companies**

M/s..... a company registered under the Companies Act, 1956 and having its registered office atin the State of (hereinafter called "the said Contractor" which expression shall unless the context requires otherwise include its administrators, successors and assigns).

3 PROFORMA OF BANK GUARANTEE TO SECURE A LUMP SUM ADVANCE

(On Non-Judicial Stamp Paper of Appropriate Value)

To
Nuclear Power Corporation of India Ltd.

.....

.....

In consideration of the Nuclear Power Corporation of India Ltd. (..... Atomic Power Project) having its registered Office at (hereinafter called "the Owner" which expression shall unless repugnant to the subject or context include its successors and assigns) having agreed under the terms and conditions of Award Letter No. dated issued by Owner which has been unequivocally accepted by *..... in connection with the work of "....." Tender No..... (hereinafter called "the said Contract") to make at the request of the Contractor a lumpsum advance of Rs. (Rupees..... only) for utilizing it for the purpose of the Contract on his furnishing a guarantee acceptable to the Owner. We,..... Bank incorporated under and having one of our branches at (hereinafter referred to as "the said Bank") do hereby guarantee the due recovery by the Owner of this said advance with interest thereon as provided according to the terms and conditions of the Contract. If the said Contractor fails to utilize the said advance for the purpose of the Contract and/ or the said advance together with interest thereon as aforesaid is not fully recovered by the Owner, We, Bank hereby unconditionally and irrevocably undertake to pay to the Owner on demand and without demur to the extent of the said sum of Rs..... (Rupees..... only) on any claim made by the Owner on us for the loss or damage caused to or suffered by the Owner by reason of the Owner not being able to recover in full the said sum of Rs..... (Rupees..... only) with interest as aforesaid.

2. We,..... Bank, further agree that the Owner shall be the sole judge of and as to whether the said Contractor has not utilized the said advance or any part thereof for the purpose of the contract and the extent of loss or damage caused to or suffered by the Owner on account of the said advance together with interest not being recovered in full and the decision of the Owner that the said Contractor has not utilized the said advance or

**Refer note at the end of the proforma*

any part thereof for the purpose of the Contract and as to the amount or amounts of loss or damage caused to or suffered by the Owner shall be final and binding on us.

3. We, the said Bank further agree that the Guarantee herein contained shall remain in full force and effect during the period that would be taken for the performance of the said Contract and till all the said advance with interest has been fully recovered and its claims satisfied or discharged and till Owner certifies that the said advance with interest has been fully recovered from the said Contractor, and accordingly shall have no claim under this guarantee after 30 (thirty) days from the date of satisfactory completion of the said Contract (as per the mutually agreed work schedule) i.e. upto and inclusive of(date) unless a notice of the claim under this Guarantee has been served on the Bank before the expiry of the said period i.e..... (date) in which case the same shall be enforceable against the Bank notwithstanding the fact, that the same is enforced after the expiry of the said period.
4. The Owner shall have the fullest liberty without effecting in any way the liability of the Bank under this Guarantee or Indemnity, from time to time, to vary any of the terms and conditions of the said Contract or the advance or to extend time of performance by the said Contractor or to postpone for any time from time to time any of the powers exercisable by it against the said Contractor and either to enforce or forbear from enforcing any of the terms and conditions governing the said contract or the advance available to the owner and this said bank shall not be released from its liability under these presents by any exercise by the Owner of the liberty with reference to the matters aforesaid or by reasons of time being given to the said Contractor or any other forbearance act or omission on the part of the Owner or any indulgence by the Owner to the said Contractor on of any other matter or thing whatsoever which under the law relating to sureties would, but for this provision, have the effect of so releasing the Bank from its such liability.
5. It shall not be necessary for the Owner to proceed against the Contractor before proceeding against the Bank and the Guarantee herein contained shall be enforceable against the Bank notwithstanding any security, which the Owner may have obtained or obtain from the Contractor shall at the time when proceedings are taken against the Bank hereunder, be outstanding or unrealised.
6. We, the said Bank, lastly undertake not to revoke this Guarantee during its currency except with the previous consent of the Owner in writing and agree that any change in the Constitution of the said Contractor or the said Bank shall not discharge our liability hereunder.

If any further extension of this Guarantee is required the same shall be extended to such required periods on receiving instructions from M/s..... on whose behalf this Guarantee is issued.

Notwithstanding anything contained herein before our liability under this Guarantee is restricted to Rs,..... (RupeesOnly) together with interest. Our undertaking shall commence from the date of execution and shall remain in force upto

Dated thisday of.....20...

In presence of

For and on behalf of (the Bank)

WITNESS

1_____

Signature _____

2_____

Name & Designation_____

Authorisation No_____

Seal of the Bank_____

Accepted

(Signature of the Officer)
For and On behalf of the
Nuclear Power Corporation of India Ltd.,

NOTES

***For Proprietary Concerns**

Shri son of..... resident ofcarrying on business under the name and Style of.....at...
.....(herein after called " the said Contractor" which expression shall unless the context requires otherwise include his heirs, executors, administrators and legal representatives).

***For Partnership Concerns**

M/s..... a partnership firm with its office.....(hereinafter called " the said Contractor" which expression shall unless the context requires otherwise include their heirs, executors, administrators and legal representative); the names of their partners being

(i) ShriS/o.....

(i) ShriS/o.....

***For Companies**

M/s. _____ a company under the Companies Act, 1956 and having its registered office at_____ in the State of_____(hereinafter called "the said Contractor" which expression shall unless the context requires otherwise include its administrators, successors and assigns).

4. FORM OF HYPOTHECATION DEED

(ON NON-JUDICIAL STAMP PAPER ON APPROPRIATE VALUE)

THE INDENTURE made thisday of20..... BETWEEN of the one part (herein after called `Contractor') and Nuclear Power Corporation of India Ltd. (..... Atomic Power Project/ Station) hereinafter called " the Corporation" which expression shall unless the context requires otherwise include his successors and assigns of the other part:

WHEREAS under sub-clause 12.1 of the General Conditions of Contract relating to the terms and conditions of its Award letter No.....datedwhich have been unequivocally accepted by the Contractor, the Contractor has applied to the Corporation for a loan of Rs..... (Rupees)Only) for plant and equipment described in the Schedule here to specifically acquired by the Contractor for the works and brought to site.

AND WHEREAS one of the conditions on which the said loan of Rs...../- granted by the Corporation to the Contractor is that the Contractor shall hypothecate the plant and equipment described in the Schedule hereto in favour of the Corporation as security for the due repayment of the said loan.

AND WHEREAS the Contractor has represented that he is the Owner of the plant and equipment described in the Schedule hereto and the same is free from encumbrances.

NOW THIS INDENTURE WITNESSETH THAT in pursuance of the said agreement and in consideration of the premises the Contractor doth hereby hypothecate, assign and transfer to the Corporation the Plant and equipment described in the Schedule hereto the intent that the same shall remain and form security for repayment to the Corporation of the said loan of Rs..... together with the interest thereon at % per annum.

1. The Contractor hereby agrees, declares and covenants with the Corporation as follows:-
 - (a) The Contractor shall repay to the Corporation the said loan of Rs.....(Rupees..... Only) together with interest thereon as aforesaid by and agrees that the said loan be recovered by the Corporation by making deductions in the manner provided in sub-clause 12.1 of the General Conditions of Contract and other conditions of the Award letter from the claims made by the Contractor against the Corporation of "on account payment".

- (b) The Contractor has paid in full the purchase price of the Plant & Equipment described in the Schedule hereto and each and every one of them and that the same are the absolute property of the Contractor and that the same have not been sold, pledged, mortgaged or transferred or in any way dealt with by the Contractor.
- (c) So long as any amount remains payable to the Corporation by the Contractor in respect of the said loan of Rs._____ the Contractor shall not sell, pledge, hypothecate, transfer, part with or in any way deal with the Plant and Equipment described in the Schedule hereto.
- (d) If the said loan of Rs._____ shall not be repaid by the Contractor or recovered in the manner described above by the saidday of due to any reasons whatsoever or the said Contract has been determined earlier or cancelled or if the Contractor shall sell, pledge, mortgage, transfer, part with or in any way deal with the said plant and equipment or any part thereof or the Contractor or any of the partners is adjudged insolvent or the Contractor is to be wound up or makes any composition or arrangement with its creditors or the Contractor shall commit breach of any of the terms and conditions or covenants as herein contained or if any of the said plant and equipment or if any other property whatsoever belonging to the Contractor has been sold or attached for a period of not less than 21 days in execution of the decree of any court for payment of money, the whole of the said loan of Rs. or such part thereof as may remain unpaid or unrecovered together with interest thereon shall forthwith become due and payable.
- (e) The Corporation may on the happening of any of the events mentioned in the preceding clause (d) or in the event of the said loan or any part thereof becoming due and payable and has not been paid or recovered or cannot be recovered as provided in the said conditions, seize and take possession of the said plant and equipment (and either remain in possession thereof without removing the same or else may remove the same) and sell the said plant and equipment or any of them either by public auction or private contract and may out of the sale proceeds retain the balance of the said loan and interest thereon remaining unpaid and unrecovered and all costs, charges and expenses and payments incurred or made in maintaining, defending or protecting the rights of the Corporation hereunder and shall pay over the surplus, if any, to the Contractor.
- (f) The Contractor shall at all times during the continuance of the security and at the expense of the Contractor insure and keep insured and plant and equipment described in the Schedule hereto for the value thereof in the joint names of the Contractor and the Corporation with an insurance company to be approved by the Engineer-in-charge against the risk of loss or damage from whatever cause arising other than the

Excepted Risks not covered under the insurance. During the continuance of the security the Contractor shall pay all premia and sums of money necessary for keeping such insurance on foot and the insurance policy and receipts in original for premia paid shall be deposited with the Engineer-in-charge. The Contractor shall assign all his rights, title and interest in the policy to the Corporation.

(g) The Contractor shall not permit or suffer the said plant and equipment or any part thereof to be destroyed or damaged or used or to be used or to deteriorate in a greater degree than it would deteriorate by reasonable wear and tear thereof in the performance of the Contract.

(h) In the event of any damage or loss happening to the said plant and equipment or any part thereof from whatever cause other than the Excepted Risk [not covered under insurance] the Contractor shall forthwith have the same repaired or replaced as the case may be or arrange for payment of the entire amount recovered or to be recovered from the insurance company to the Corporation towards the payment of the said loan of Rs.....

2 Upon repayment or recovery in full of the amount secured on account of this hypothecation deed the said plant and equipment secured hereunder shall stand released from hypothecation but this is without prejudice to the right of the Corporation under any other conditions of the Contract.

SCHEDULE ABOVE REFERRED TO

Sr. No.	Particulars of Plant and Equipment	Nos.	Purchase price/ considered reasonable by Engineer-in-Charge	Total price	Advance(75% of Col.5)
1	2	3	4	5	6

IN WITNESS WHEREOF the parties hereto have executed these presents on the
day and your first above written

Signed and delivered
by the within named

Signed by Shri _____
(Name and Designation)
Nuclear Power Corporation of India Ltd.,
(_____Atomic Power Project)

in the presence of :

(1)_____ (1)_____
(2)_____ (2)_____

***NOTES**

***For Proprietary Concerns**

Shri _____ son of _____ resident of _____ carrying on business under the name and Style of _____ at _____ (hereinafter called " the said Contractor" which expression shall unless the context requires otherwise include his heirs, executors, administrators and legal representatives.

***For Partnership Concerns**

M/s. _____ a partnership firm with its office _____ (hereinafter called " the said Contractor" which expression shall unless the context requires otherwise include their heirs, executors, administrators and legal representative); the names of their partners being

(i) Shri _____ S/o. _____

(ii) Shri _____ S/o. _____

***For Companies**

M/s..... a company registered under the Companies Act, 1956 and having its registered office at in the State of (hereinafter called "the said Contractor" which said Contractor" which expression shall unless the context requires otherwise include its administrators, successors and assigns).

24 DISPUTES RESOLUTION BOARD AGREEMENT

THIS AGREEMENT, made and entered into this Day of
.....20 Between ("the Corporation") and
.....
..... ("the Contractor"), and the
Disputes resolution Board ("the Board") consisting of three Board Members, (1)
..... (2)
..... (3)
.....

WITNESSETH, that

WHEREAS, the Corporation and the Contractor have contracted for the construction of the
.....
..... (Project
name) (the "Contract") and
WHEREAS, the contract provides for the establishment and operation of the Board NOW
THEREFORE, the parties hereto agree as follows :

1. The parties agree to the establishment and operation of the Board in accordance with this Board Agreement.
2. Except for providing the services required hereunder, the Board Members should not give any advice to either party concerning conduct of the Works.

The Board Members :

- (a) shall have no financial interest in any party to the contract, or a financial interest in the contract, except for payment for services on the Board.
- (b) shall have had no previous employment by, or financial ties to, any party to the contract, except for fee based consulting services on other projects, all of which must be disclosed prior to appointment to the Board.

- (c) shall have disclosed in writing to the parties prior to signature of this Agreement any and all recent or close professional or personal or personal relationships with any director, officer, or employee of any party to the contract, and any and all prior involvement in the project to which the contract relates;
 - (d) shall not, while a Board Member, be employed whether as a consultant or otherwise by either party to the contract, except as a Board Member.
 - (e) shall not, while a Board Member, engage in discussion or make any agreement with any party to the contract, regarding employment whether as a consultant or otherwise either after the contract is completed or after services as a Board Member is completed;
 - (f) shall be and remain impartial and independent of the parties and shall disclose in writing to the Corporation, the Contractor, and one another any fact or circumstances which might be such to cause either the Corporation or the Contractor to question the continued existence of the impartiality and independence required of Board Members.
3. Except for its participation in the Board's activities as provided in the contract and in this Agreement none of the Employer, the Contractor, the Nodal Officer or his nominee, and one another any fact or circumstances which might be such to cause either the Employer or the Contractor to question the continued existence of the impartiality and independence required of Board Members.
4. The Contractor shall :
- a) furnish to each Board Members one copy of all documents which the Board may request including contract documents, progress reports, variation orders, and other documents, pertinent to the performance of the Contract.
 - b) in co-operation with the Employer, co-ordinate the Site visits of the Board, including conference facilities, and secretarial and copying services.
5. The Board shall serve throughout the operation of the contract. It shall begin operation following execution of this Agreement, and shall terminate its activities after issuance of the taking over Certificate and the Board's issuance of its Recommendations on all disputes referred to it.
6. Board Member, shall not assign or subcontract any of their work under this Agreement.

7. The Board Members are independent and not employees or agents of either the Employer or the Contractor.
8. The Board Members are absolved of any personal or professional liability arising from the activities and the Recommendations of the Board.
9. Fees and expenses of the Board Member[s] shall be agreed to and shared equally by the Employer and the Contractor. If the Board requires special services, such as accounting, data research, and the like, both parties must agree and the costs shall be shared by them as mutually agreed.
10. Board Site visits :
 - a) The Board shall visit the Site and meet with representatives of the Employer and the Contractor and at regular intervals, at times of critical construction events, and at the written request of either party. The timing of Site visit, failing agreement shall be fixed by the Board.
 - b) Site meetings shall consist of an informal discussion of the status of the construction of the works followed by an inspection of the works, both attended by personnel from the Employer, the Contractor .
 - c) If requested by either party or the Board, the Employer will prepare minutes of the meetings and circulate them for comments of the parties.
11. Procedure for disputes referred to the Board :
 - a) If either party objects to any action or inaction of the other party, the objecting party may file a written Notice of Dispute to the other party stating that it is given pursuant to relevant clause and stating clearly and in detail the basis of the dispute.
 - b) The party receiving the Notice of Dispute will consider it and respond in writing within 7 days after receipt.
 - c) This response shall be final and conclusive on the subject, unless a written appeal to the response is filed with the responding party within 7 days of receiving the response. Both parties are encouraged to pursue the matter further to attempt to settle the dispute. When it appears that the dispute cannot be resolved without the assistance of the Board either party may refer the dispute to the Board by written Request for Recommendation to the Board, and the other party stating that it is made pursuant to relevant Clause.

- d) The Request for recommendation shall state clearly and in full detail the specific issues of the dispute to be considered by the Board.
- e) When a dispute is referred to the Board, and the Board is satisfied that the dispute requires the Board's assistance, the Board shall decide when to conduct a hearing on the dispute. The Board may request that written documentation and arguments from both parties be submitted to each Board Members before the hearing begins. The parties shall submit insofar as possible agreed statements of the relevant facts.
- f) During the hearing, the Contractor and the Employer, shall each have ample opportunity to be heard and to offer evidence. The Board's Recommendations for resolution of the dispute will be given in writing, to the Employer and the Contractor as soon as possible, and in any event not more than 28 days after the Board's final hearing on the dispute.

12. Conduct of Hearings :

- a) Normally hearing will be conducted at the Site, but any location that would be more convenient and still provide all required facilities and access to necessary documentation may be utilised by the Board. Private sessions of the Board may be held at any location convenient to the Board.
- b) The Employer and the Contractor shall have representatives at all hearings.
- c) During the hearings, no Board Member shall express any opinion concerning the merit of any facet of the case.
- d) After the hearing are concluded, the Board shall meet privately to formulate its Recommendations. All Board deliberations shall be conducted in private, with all individual views kept strictly confidential. The Board's Recommendations, together with an explanation of its reasoning shall be submitted in writing to both parties. The Recommendations shall be based on the pertinent contract provisions, applicable laws and regulations, and the facts and circumstances involved in the dispute.

The Board shall make every effort to reach a unanimous Recommendation. If this proves impossible, the majority shall decide, and the dissenting member any prepare a written minority report for submission to both parties.

- 13. If during the contract period, the Corporation and the Contractor are of the opinion that the Dispute Resolution Board is not performing its functions properly, the Corporation and the Contractor may together disband the Disputes Resolution Board. In such an event,

the disputes shall referred to Arbitration straightaway.

The Corporation and the Contractor shall jointly sign a notice specifying that the Board shall stand disbanded with effect from the date specified in the notice. The notice shall be posted by a registered letter with AD or delivery of the letter, even if he refuses to do so.

SCHEDULE 'A'

S. No.	Clause no. of GCC/NIT	Description	Stipulation	
1.	GCC 1.1.1	Contract Accepting authority	ED (Projects-LWR)	
2.	GCC 2.1.3	Time by which possession of site will be given	Immediate after issue of LOI/WO	
3.	GCC 4.14.1	Availability of electricity	Yes	
4.	GCC 4.14.1	The rate at which electricity will be charged	Rs. 12.85	Prevailing TNEB Tariff
5.	GCC 4.19.2	Number of trees to be planted by the contractor	NA	
6.	GCC 4.22.1	Number of Apprentices to be trained by the contractor	0	
7.	GCC 4.23.2	Availability of water supply by Corporation	No	
8.	GCC 4.23.2(i)	Water charges	NA	
9.	GCC 4.24.2	Availability of Land / office space for Contractor's Office, Stores etc.	Yes	
10.	GCC 5.2	Schedule of employment of labour		
		(i) As per Central Government	As per Section III	
		(ii) As per State Government	As per Section III	
11.	GCC 5.6.3	Penalty, for not providing arrangements and facilities as per safety guidelines.	As per Section III	
12.	GCC 5.6.4	Industrial safety training to be provided by Corporation.	Yes	
13.	GCC 5.6.14	Minimum number of safety professionals to be deployed by contractor.	2	
14.	GCC 5.6.15	Penalty, for not deploying the minimum number of safety professionals.	As per Section III	
15.	GCC 7.8.1	Applicability of incentive clause	No	
16.	GCC 7.8.2	Maximum value of the contract value, which shall be paid as incentive.	NA	
17.	GCC 7.9.3	No of days of suspension for Entitlement of compensation if cumulative period of suspension exceeds	30 days and as per note no. 1 below	
18.	GCC 9.1.1	Defect Liability Period for the contract	36 Months	
19.	GCC 9.1.6	Applicability of liability towards Latent defect	Applicable	
20.	GCC 11.3.3	Various components expressed as a percentage of contract Price.		
21.		Fixed component (F)	15	
		Unskilled labour component (lu)	13	
		Semi-skilled labour component (lss)	NA	
		Skilled labour component (ls)	12	
		Highly skilled labour component	0	
		Material component		
		Cement & Lime	(m)	4
		Ferrous Steel	(n)	12
		Other Materials	(o)	26
			(p)	0
		All other Materials	(q)	0
		P.O.L component (d)	2	
		Non escalable component (NE)	16	
		Nearest fuel station to be considered for diesel prices (P.O.L)	Anuvijay Township	
22.	GCC 12.1.4	The rate of Interest to be charged on mobilization advance	10.970%	

S. No.	Clause no. of GCC/NIT	Description	Stipulation
23.	GCC 12.2.1	Applicability to submit the bills and measurement in computerised form	Applicable
24.	GCC 12.5.1	Simple interest for delayed payment.	12.250%
25.	GCC 15.1; Clause no. 3 of Part 1 of NIT; Clause no. 5 of Part 1 of NIT	(a) Employee compensation policy	Yes
		(b) Coverage under ESI (Employee State Insurance)	NA
		(c) Third Party liability @ 10 % of the contract price subjected to maximum of rupees 50.00 lakhs.	Applicable
		(d) CAR/ EAR Policy for the whole contract value	Applicable
		(e) Comprehensive Insurance policy for Transport contracts	Not Applicable
		(f) EPF (Employees' Provident Fund) registration	Applicable
		(g) Group Insurance Policy	Applicable
26.	Clause no. 6.1 of Part 1 of NIT	Applicability of Electrical Contractor License	Not Applicable
27.	Clause no. 7 of Part 1 of NIT; Clause no. 30 of (Part 2) of NIT	Permission for joint venture (unincorporated) / consortium to participate	Yes
28.	NIT (Part 2) 35.0	Supplier (in case of CLND act)	NPCIL
29.	NIT (Part 2) 28.0	Applicability of the Building and Other Construction workers (Regulation of Employment and Conditions of Service) (BOCW) Act, 1996 and the Cess Act, 1996	Applicable
		Rate of labour cess (as per BOCW)	1%
30.	NIT (Part 2) 27.0	Applicability of integrity pact	Applicable
31.	Clause no. 8 of Part 1 of NIT; Clause no. 25 of Part 2 of NIT	a) Purchase preference to MSE registered bidders	Not applicable
		b) Waiver for Submission of bid security	Not applicable
		c) Splitting of quantity for award to MSE	Not applicable
		d) Exemption/ Relaxation from meeting the qualification criteria in respect of prior experience and financial criteria viz. (Turnover, Profit before Tax, Bid Capacity, Solvency/Net Worth/Credit Rating/Line of Credit) for eligible MSE(s) subject to meeting of quality and technical specifications	No
		e) In case of exemption/relaxation from meeting the qualification criteria in respect of prior experience and financial criteria viz. (Turnover, Profit before Tax, Bid Capacity Solvency/Net Worth/Credit Rating/Line of Credit), the clause stipulating meeting of quality and	Not applicable

S. No.	Clause no. of GCC/NIT	Description	Stipulation
		technical specifications	
32.	Clause no. 9 of Part 1 of NIT; Clause no. 32 of Part 2 of NIT	a) Exemption/ Relaxation from meeting the qualification criteria in respect of prior experience and financial criteria viz. (Turnover, Profit before Tax, Bid Capacity, Solvency/Net Worth/Credit Rating/Line of Credit for eligible Startup(s) subject to meeting of quality and technical specifications	No
		b) Waiver for Submission of bid security	Not applicable
		c) In case of exemption/relaxation from meeting the qualification criteria in respect of prior experience and financial criteria viz. (Turnover, Profit before Tax, Bid Capacity Solvency/Net Worth/Credit Rating/Line of Credit), the clause stipulating meeting of quality and technical specifications	Not applicable
33.	NIT (Part 2) 33	Divisibility of Scope in Make in India clause no. 33	Non-Divisible
34.	NIT (Part 2) 33	Eligibility of Class of Contractor as per Make in India Order	Class I Local Supplier/ Class II Local Supplier
35.	NIT (Part 2) 33	Minimum Local Content (%) for Class I Local Supplier	More than 50%
36.	NIT (Part 2) 33	Minimum Local Content (%) for Class II Local Supplier	More than 20%
37.	NIT (Part 2) 36.0	Applicability of Contract employee information management system	Applicable
38.		Minimum number of labours to be deployed	
		a) Unskilled	0
		b) Semi- Skilled	0
		c) Skilled	0
		d) Highly skilled	0
		e) Any other category	0
39.		Penalty for shortfall of minimum number of Labours to be deployed as per special condition of contract	
		a) Unskilled	0
		b) Semi- Skilled	0
		c) Skilled	0
		d) Highly skilled	0
		e) Any other category	0

S. No.	Clause no. of GCC/NIT	Description	Stipulation
40.		Applicability of Factory Act	Applicable
41.		Place of service	Anuvijay Township
42.		Minimum number of Work Supervisor/ Engineer to be deployed	Engineers -2 Nos Supervisors -2 Nos
43.	NIT (Part 2) 13.0	Bid Validity	180 days

Note: (1) This clause shall be applicable when the cumulative suspension is beyond 30 days. In specific cases such as contracts related to bi-annual shutdown, refueling outage etc., reduced number of days may be specified on case to case basis. (in reference to S.No. 17 of Schedule A)

SCHEDULE 'B'**MATERIAL ISSUED TO THE CONTRACTOR**

(The Engineer-in-charge/Officer-in-charge to indicate permissible wastage before issue of tender duly approved by the Competent Authority)

Sl. No	Particulars	Unit	Rate at which Material will be issued	Maximum invisible wastage (Non-Returnable) (%)	Maximums permissible wastage (Returnable in case of free issue) (%)	Qty. to be issued (approx.)
----- NA-----						

SCHEDULE 'C'**TOOLS AND PLANT TO BE HIRED TO THE CONTRACTOR**

Sr. no.	Particulars	Number available	Hire charges per Unit per working day Rs.	Frequency of Maintenance	Value Per Unit	Place of Issue	Number Reqd. by the Contractor
----- NA-----							

Tools and Plants are not expected to be hired out to the Contractor. If, however, any tools and plants are available at the time of performing the work the same may be hired out at rates to be decided by the Engineer-in-charge/Officer-in-charge. The Corporation reserves the right not to hire out any T&P and to withdraw at any time such T&P hired out.

The Contractor shall ask the Engineer-in-charge/Officer-in-charge the value of tools & Plants for which these have to be insured and carry out the insurance accordingly in case insurance not available with NPCIL.

ADDENDUM :

Clause Ref. No.	Existing Clause	Revised Clause
7.9.3(ii)	If the total cumulative period of all such suspension exceeds 30 days the contractor shall, in addition, be entitled to compensation for the period of suspension beyond 30 days, as mentioned in the Schedule A. However, the contractor shall submit within 10 days his claim to the engineer-in-charge for every 15 days of suspension, over and above 30 days.	If the cumulative period of all suspension(s) exceeds 30 days, the Contractor shall, in addition, be entitled to compensation for the period of suspension beyond initial 30 days, in respect of wages for the employees and workers, idling charges for plants, machineries and equipments, etc. physically available at the site. However, the Contractor shall, at the earliest within a maximum period of 15 days, from the date of suspension, submit its claim to the Engineer-In-Charge, for every 15 days of suspension, over and above the initial 30 days period of suspension, along with all documentary evidence available in respect of the employees, workmen, plants, machineries and equipments remaining idle during such period of suspension. In this regard, the Engineer-In-Charge shall after giving an opportunity of being heard to the Contractor, assess, calculate, decide and settle the claims so submitted by the Contractor and that the decision of Engineer-In-Charge shall, in this regard, be final and binding upon the Contractor.

NUCLEAR POWER CORPORATION OF INDIA LIMITED
SPECIAL CONDITIONS OF CONTRACT (SCC)

Supplement/Amendment to GCC which shall be incorporated in Special Conditions of Contract (S.C.C.):

The following clause in Special Conditions of Contract (S.C.C.) shall supplement/amend General Conditions of Contract (GCC). Wherever there is a conflict between the two, the provisions in SCC shall prevail over those in GCC:

11.11. Taxes and Duties (refer clause no. 11.11 of Part 2 (Standard Part of NIT)):

11.11.1 Indirect Taxes and Duties:

1.1.1. As the contract price / rates / total contract price quoted is inclusive of all statutory liabilities, taxes (including GST), cess, duties, levies, BOCW cess, fees, royalty, commission, costs towards compliance of EPF, ~~ESI~~, other labour laws, applicable insurance, etc as applicable under the prevailing statutes or levy by the statutory authorities/State/UT/Central Government, the Contractor shall be responsible to pay the same to concerned authorities. The applicable GST rate (%) shall be shown separately in the price bid format along with Part 2 or Price Bid.

11.11.1.2 Since total contract price is inclusive of all taxes, duties, levies, cess etc as stated above(in clause no. 11.11.1.1) including GST, no separate reimbursement on this account will be applicable on price adjustment, if any, payable under the contract.

11.11.1.3 In case, there is deviation in GST rate quoted in the price bid and GST rate as applicable within contractual completion period, GST as applicable or quoted, whichever is lower will only be reimbursed by Corporation.

11.11.1.4 In case of increase in existing rate of GST and /or introduction of any other new tax or cess, if levied by Government during the contractual completion period, the incremental rate of GST (with respect to existing rate) and/or any other new tax or cess, shall be reimbursed/paid by the Corporation upon verification of the necessary documentary evidence submitted and its acceptance by the Corporation. The payment/reimbursement of statutory variations in the rates of GST and/or of new tax or cess imposed under statute or law in India as above would be restricted only to direct transactions between the Corporation and the Bidder. This provision shall not apply to changes in Personal Income tax or Corporate Income tax or to changes in non-Indian Taxes.

11.11.1.5 Statutory variation in any other statutory liabilities, taxes (excluding GST), cess, duties, levies, BOCW cess, fees, royalty, commission etc during the currency of the contract shall not be reimbursed / paid by the Corporation and it shall be the sole responsibility of the Bidder to bear such variations.

- 11.11.1.6** For extension in the contractual completion date for the reasons attributable to the Corporation and/or Force Majeure, increase in existing GST and new Tax or cess, if introduced by Government in the extended period shall be reimbursed to the Contractor upon verification of the necessary documentary evidence submitted and its acceptance by the Corporation. No increase in GST, new tax or cess if introduced by the Government shall be payable during the period of delay due to the reasons attributable to the Contractor.
- 11.11.1.7** If there is an upward revision in the rate of GST within contractual completion date due to change in classification by the bidder, such upward revision shall not be entertained as per clause no 11.11.1.4 & 11.11.1.6 and the payment towards GST will be restricted to the quoted rate of GST.
- 11.11.1.8** GST on Liquidated Damages (LD), if applicable, and/or penalty, if applicable, shall be to the account of the Contractor and shall be recovered from payments due to the Contractor.
- 11.11.1.9** The bidders are required to examine the provisions of The Central Goods and Services Tax Act 2017(CGST), The Integrated Goods and Services Tax Act 2017(IGST), The relevant SGST act of the State Government, The Union Territories Goods and Services Tax Act 2017(UTGST) and The Goods and Services Compensation to States Tax Act 2017 and their Rules as being enacted and amended from time to time. The bidders are required to take into account all input tax credits and the exemptions available therein while furnishing their bids.
- 11.11.1.10** The Bidder shall quote the prices giving breakup in the manner specified in the prescribed price bid format along with Part-2 (Price bid). The Bidder shall quote the applicable rate of GST (%) in the appropriate place.
- 11.11.1.11** The Bidder shall indicate the GST (%) as applicable seven (7) days prior to last date for Bid Submission.
- 11.11.1.12** In case of bid received from bidder(s) who have opted for the composition scheme under GST Law, the bidder(s) shall specifically mention the same in his Bid. Corporation shall not be liable to pay/reimburse any GST on the work executed by such bidders under the Contract.
- 11.11.1.13** In case of bid received from unregistered contractors a declaration to this effect shall be submitted.
- 11.11.1.14** In case of all materials identified by the Contractor and Corporation to be dispatched directly from the sub-vendor's work to Corporation's site, the Contractor shall ensure that his sub-vendors raise Tax invoices as per the provisions of GST Law, "Billed to the Contractor and Shipped" to the Corporation's site. The Contractor shall further ensure that he raises his corresponding Tax Invoices in the name of Corporation during transit of the materials before the delivery of materials is taken by Corporation.

- 11.11.1.15** The implications of GST on return of goods will be as per the provisions of the relevant GST Laws.
- 11.11.1.16** Bidders are required to provide their GST Registration numbers in Part-I (Technical and Commercial bid except price).
- 11.11.1.17** While claiming the GST, the bidders are required to adhere to the provisions available therein. The Contractors are required to ensure that, the details of GST charged in the Invoice and other details are filled in the GST Returns within the due date as notified by the GST Council, and also certify the same in Annexure-A, only upon which reimbursement of GST would be considered.
- 11.11.1.18** Please note that in case of any refund/credit to GST if granted to bidders by GST Authorities in respect of work executed under the contract, bidders will pass on the credit to the Corporation immediately along with a certificate from bidder's Director/Manager/Proprietor/Accountant that the credit so passed on relates to the GST originally paid for work executed under the contract.
- 11.11.1.19** When GST is claimed by the Contractor in general the certificate as per Annexure-A should be submitted to the paying authority with their invoices.
- 11.11.1.20** Input Tax Credit (ITC) available to the bidders shall be taken into consideration while quoting price and bidder shall pass on all such available ITC benefits to the Corporation. In case any additional ITC benefit is granted to the bidder by GST authorities after bid submission, the same shall be immediately passed on to the Corporation and such value shall be indicated in the respective Annexure-A submitted along with the invoice for work executed under the contract.
- 11.11.1.21** The performance guarantee, insurance amount, retention money shall be calculated on all inclusive total contract price (stated as per clause no. 11.11.1.1).

11.11.2 Direct Tax -Tax Deduction at Source:

- 11.11.2.1** The Corporation shall have the right to withhold taxes on income, excess profits, royalty and other taxes from payments due to Contractor under this Contract to the extent that such withholding may be required by the government of India or any relevant authority thereof or by the government of any other country, and payment by the Corporation to the respective governmental office of the amount of money so withheld will relieve the Corporation from any further obligation to Contractor with respect to the amount so withheld.
- 11.11.2.2** The Corporation shall, at the time of their payments due to the Contractor, withhold the necessary taxes at such rate as is required by any Government Authority, unless and to the extent that the Contractor shall produce to the Corporation any certificate issued by a Government Authority (having authority to issue such certificate) entitling the Contractor to

receive the payments under the Contract for a prescribed period without deduction of any tax or deduction at a lower rate.

11.11.2.3 The Corporation shall provide the necessary withholding tax certificates to the Contractor within the time stipulated by the relevant law to enable the Contractor to file the same with the Government Authority as a proof of payment of such taxes.

11.11.2.4 All taxes levied on Contractor's corporate income or profits shall be for the account of Contractor and shall not be reimbursed by the Corporation. Contractor shall also be responsible for payment of income taxes of its personnel levied in India or elsewhere.

11.11.3 Indirect Tax-Tax deduction at source:

11.11.3.1 The Corporation shall, at the time of its payments due to the Contractor, withhold the necessary tax at source at such rate if required under the legislation unless and to the extent that the Contractor shall produce to the Corporation any certificate issued by a Government Authority (having authority to issue such certificate) entitling the Contractor to receive the payments under the Contract for a prescribed period without deduction of any tax or deduction at a lower rate.

11.11.3.2 In case of such deductions as mentioned above, the Corporation shall provide the necessary withholding tax certificates to the Contractor within the time stipulated by the relevant law to enable the Contractor to file the same with the Government Authority as a proof of payment of such taxes.

11.11.3.3 The Contractor shall be responsible for filing all necessary Tax returns (including, without limitation, returns for Corporate Income tax, Personal Income tax and GST) with the relevant Government Authorities in accordance with all applicable statutory requirements and shall be responsible for providing all information requested by such Government Authorities.

Annexure- A

The Contractor while submitting their bill to the Paying Authority shall furnish the following certificates:

Certified that: (Please Tick all appropriate boxes)

- ☐ (a) Additional Input Tax Credit under GST availed against invoices submitted here under is Rs. _____.
- ☐ (b) Certified that the goods and services on which GST has been charged are not exempted under the GST Act or the rules made there under and the amount charged on account of GST on these goods and services are not more than what is payable under the relevant act or the rules there under.
- ☐ (c) Certified that we have taken into account all input tax credits available under GST and have not loaded the same in the basic price while furnishing their bids.
- ☐ (d) Certified that in respect of amount of taxes claimed in the bill no claim is pending for refund/or is admissible for refund from any other agency and /or no other tax credit is available in respect of the same. In the event of getting refund in whole or in part of the element of GST claimed from Government, the same shall be passed on the benefit to the Corporation by remitting the amount equivalent to the amount of refund obtained.
- ☐ (e) Certified that the GST charged herein the invoices has been/ shall be deposited within the due date and the Invoice details have been / shall be populated in GSTR1/ANX-1 of the GSTN portal facilitating Input Tax Credit to the Corporation.
- ☐ (f) Certified that we have complied with the Anti-profiteering measure provisions under CGST/SGST/UTGST Acts and passed on commensurate reduction of price to the Corporation.
- ☐ (g) Certified that a quarterly statement shall be submitted to NPCIL confirming the payment of GST invoiced on NPCIL along with copy of GST paid Challan.

Signature of Contractor or their Authorised Representative with company seal.

Addendum no, 2 (GCC for Works and Service Maintenance Contract)

S. No.	GCC Clause ref. no.	Existing Clause	Amended/Revised Clause
1.	4.2.11 (New Clause)	—	<p>Cases where IP (Integrity Pact) is applicable: After the release of the EMD, the SD (i.e., Performance Guarantee plus available Retention Money) will serve the purpose of Integrity Pact Security seamlessly during execution of Contract and till the completion of the defect liability period (if applicable), or 12 months from the date of the last payment/final bill payment, whichever is later. In such case, for any violation/breach of the Integrity Pact by the Contractor, the SD (i.e., Performance Guarantee plus available Retention Money), shall be forfeited.</p> <p>The Contractor shall initially submit Performance Guarantee, as per relevant clauses of Contract to start with. However, the Contractor will also be required to extend the validity of Performance Guarantee, till validity of the IP if required. The Performance Guarantee and Retention Money will be released after completion of the defect liability period (if applicable), or 12 months from the date of the last payment/final bill payment, whichever is later.</p> <p>If contract security is waived/not available for seamless commitment towards IP, action as per Contract conditions & IP shall be taken against any violation of IP.</p> <p>Further, in case of MSE/Startup, if any contract security is waived/not available for seamless commitment towards IP, the relevant authority of MSE/Startup with whom Contractor is registered shall be informed for any violation of IP.</p>
2.	4.3.3 (New Clause)	—	Security Deposit i.e., Performance Guarantee & Retention Money will be withheld till the contractor complies with all the statutory requirements.

S. No.	GCC Clause ref. no.	Existing Clause	Amended/Revised Clause
3.	11.3.4	<p>The actual amount of price adjustment shall be determined by.. ..</p> <p>.....</p> <p>SUBSCRIPT: '0' - refers to the values of the above-mentioned Minimum Wages/ Material indices/ Petrol price applicable to previous month prior to the date of submission of tenders (In case of two part tender the date of submission of Part 1 shall be taken).</p> <p>'1' - refers to the values of corresponding Minimum Wages, Material indices/ petrol price as applicable for the month prior to the month in which the work is executed for which adjustment is applicable, respectively.</p>	<p>The actual amount of price adjustment shall be determined by.....</p> <p>.....</p> <p>SUBSCRIPT: '0' - refers to the values of the above-mentioned Minimum Wages/ Material indices/ Petrol price applicable to previous month prior to the date of submission of tenders (In case of two part tender the date of submission of Part 1 shall be taken). In case of retrospective revision in Minimum wages by Government notification, the applicable indices for labour shall be taken as the prevailing Minimum Wages (as notified till the date of submission of tenders) as on the last day of the previous month prior to the date of submission of tenders.</p> <p>'1' - refers to the values of corresponding Minimum Wages, Material indices/ petrol price as applicable for the month prior to the month in which the work is executed for which adjustment is applicable, respectively</p>
		<p>In the case of materials brought to site for which any secured advance is included in the bill; the full assessed value of such advance shall be added to the cost of work shown in the bill for operation of this Clause. Similarly, when such materials are incorporated in the work and secured advance is deducted from the bill, the full assessed value should be deducted from the cost of the work</p>	<p>In the case of materials brought to site for which any secured advance is included in the bill, the value of such advance shall be added to the cost of work shown in the bill for operation of this Clause. Similarly, when such materials are incorporated in the work and secured advance is deducted from the bill, the value of secured advance actually paid corresponding to the quantity of material used and measured in the bill should be deducted from the cost of the work shown in the bill, running or final. Further;</p> <p>a) For contracts with a contractual completion time of up to 2 years, unadjusted secured advance should be recovered through the next RA bill after expiry of 120 days from the issue of such secured advance.</p>
4.	11.3.8		

S. No.	GCC Clause ref. no.	Existing Clause	Amended/Revised Clause
		shown in the bill, running or final.	b) For contracts with a contractual completion time of more than 2 years, unadjusted secured advance should be recovered through the next RA bill after expiry of 270 days from the issue of such secured advance.
5.	12.2.1	Running bills shall be submitted, monthly by the Contractor for the work executed during the previous month along with all supporting documents on the format prescribed by the Corporation. The Engineer-in-Charge shall then arrange to have the bill verified. Where ever applicable (as defined in Schedule A) the Contractor will submit the bills in a soft form, which shall be in the format as required by the Engineer-in-charge.	Running bills shall be submitted, monthly by the Contractor for the work executed during the previous month along with all supporting documents on the format prescribed by the Corporation. The Engineer-in-Charge shall then arrange to have the bill verified. Where ever applicable (as defined in Schedule A) the Contractor will submit the bills in a soft form, which shall be in the format as required by the Engineer-in-charge. Before release of each Running Bill, the statutory compliances by the contractor will be monitored and the bills will be withheld if contractor fails to comply with statutory compliances.
6.	12.2.2 b)	For Materials: The Contractor on signing an indenture in the form to be specified by the Engineer-in-charge 75% percent of the cost (as assessed by the Engineer-in-Charge) of any materials which are in the opinion of the Engineer-in-Charge reasonably required in accordance with the Contract and have been brought to Site for incorporation in the Works and are safeguarded against loss due to any cause whatsoever to the	For Materials: The Contractor on signing an indenture in the form to be specified by the Engineer-in-charge 75% percent of the cost (as assessed by the Engineer-in-Charge) of any materials which are in the opinion of the Engineer-in-Charge reasonably required in accordance with the Contract and have been brought to Site for incorporation in the Works and are safeguarded against loss due to any cause whatsoever to the satisfaction of the Engineer-in-Charge but have not been so incorporated. However, in case of perishable materials the Contractor shall provide an insurance cover for the full cost. No secured advance shall be payable on high-risk material such as glass, sand, petrol/ diesel etc. The advance payments under this shall be adjusted as and when materials are utilised in the Works. Further;

S. No.	GCC Clause ref. no.	Existing Clause	Amended/Revised Clause
		satisfaction of the Engineer-in-Charge but have not been so incorporated. However, in case of perishable materials the Contractor shall provide an insurance cover for the full cost. No secured advance shall be payable on high-risk material such as glass, sand, petrol/ diesel etc. The advance payments under this shall be adjusted as and when materials are utilised in the Works.	<p>a) For contracts with a contractual completion time of up to 2 years, unadjusted secured advance should be recovered through the next RA bill after expiry of 120 days from the issue of such secured advance.</p> <p>b) For contracts with a contractual completion time of more than 2 years, unadjusted secured advance should be recovered through the next RA bill after expiry of 270 days from the issue of such secured advance.</p>
7.	12.4.1	The final bill shall be submitted by the Contractor within 90 days of physical completion of the works. Payment of those items of the bill in respect of which there is no dispute and of items in dispute, for quantities and at rates as approved by the Engineer-in-Charge, shall be made within the period specified hereunder. The period shall be reckoned from the date of receipt of the bill by the Engineer-in- Charge along with the all acceptable supporting documents.	The final bill shall be submitted by the Contractor within 90 days of physical completion of the works. Payment of those items of the bill in respect of which there is no dispute and of items in dispute, for quantities and at rates as approved by the Engineer-in-Charge, shall be made within the period specified hereunder. Final Bill will be released only after the contractor complies with all the statutory compliances. The period shall be reckoned from the date of receipt of the bill by the Engineer-in- Charge along with the all acceptable supporting documents.

S. No.	GCC Clause ref. no.	Existing Clause	Amended/Revised Clause
8.	13.2.2 (b)	<p>“The Engineer-in-charge shall on such determination /cancellation have powers to carry out the incomplete work by any means at the risk and cost of the contractor.”</p>	<p>13.2.2 (b) i) The Engineer-in-charge shall on such determination/termination/cancellation have powers to:</p> <ul style="list-style-type: none"> a) Forfeit the contract security such as EMD(Earnest Money Deposit)/SD(Security Deposit), as applicable; b) Procure from elsewhere the Works or services (as the case may be) same or similar to those incomplete/unexecuted, at the risk and cost of the Contractor; c) Ban business dealings with the Contractor. <p>NPCIL reserves the right to enforce any or all the above mentioned (a), (b) and (c) measures.</p> <p>13.2.2(b)ii) Further, following method shall be followed for calculation of the recovery amount against purchase of incomplete/unexecuted Works or services (as the case may be) at the risk and cost of the Contractor:</p> <ul style="list-style-type: none"> a) The recovery amount against such procurement at the risk and cost of the Contractor will include difference in original & alternate procurement cost for the incomplete/unexecuted Works or services (as the case may be) plus departmental administrative charges, which shall be calculated as below: Amount to be recovered from the Contractor against Risk & Cost purchase = [(A-B) + H] Where – A= Value of incomplete/unexecuted Works or services (as the case may be) as per rates of the new contract

S. No.	GCC Clause ref. no.	Existing Clause	Amended/Revised Clause
			<p>awarded against risk and cost of the Contractor,</p> <p>B= Value of incomplete/unexecuted Works or services (as the case may be) as per rates of the Contract and is being paid to the Contractor at the time of termination of the Contract. This shall also include price adjustment (as per clause 11.3), if applicable. The date of application of Price Adjustment clause shall be the date of termination of Contract or the original scheduled date of completion of Contract, whichever is earlier. Further, the lower of the two indices will be applicable to arrive at Price Adjustment amount.</p> <p>H= Departmental Administrative Charges of ₹ 10 lakh.</p> <p>b) Incomplete/unexecuted Works or services (as the case may be) Quantities under the contract = Contract Quantities (including quantities as amended till the date of termination) – (minus) actual executed Quantities as on the date of termination of the Contract.</p> <p>c) In the above calculations, if “A” is less than “B”, only Departmental Administrative charges shall be recovered from the Contractor.</p> <p>13.2.2(b)iii) The tender for incomplete/unexecuted Works or services (as the case may be) will be called with the same</p>

	Existing Clause	Amended/Revised Clause
		<p>specifications or other items of similar description when such Works or services (as the case may be) exactly complying with the specifications are not in the opinion (such opinion being final) of the Corporation readily procurable. Further, the tender will be called with same scope and terms and conditions (subject to applicable statutory changes/Government guidelines).</p> <p>13.2.2(b)iv) The forfeited contract security such as EMD/SD, as applicable, shall not be adjusted against the total recovery amount from defaulting contractor in case of risk and cost purchase of balance Works or services (as the case may be) from other sources. The recovery amount shall be paid by the Contractor in the form of Demand Draft/Online Transfer within 30 days of issue of demand notice by NPCIL.</p> <p>13.2.2(b)v) GST, if applicable on forfeited EMD/SD (as applicable) and balance recovery amount shall be paid by the Contractor.</p> <p>13.2.2(b)vi) In case of MSE/Startup, if no contract security (EMD/SD (as applicable)) is available for forfeiture with NPCIL, the relevant authority of MSE/Startup with whom the Contractor is registered shall be informed in this regards.</p>
<p>9.</p> <p>13.2.2 A) (New Clause)</p>	<p>—</p>	<p>13.2.2 A)</p> <p>In the event of action being taken under clause no. 13.2.2 (b), the Contractor shall also be liable for Liquidated Damages (in addition to forfeiture of Contract security as per clause 13.2.2 (b) i) a) and recovery amount as per clause 13.2.2 (b) i) b)) only for the delayed but</p>

S. No.	GCC Clause ref. no.	Existing Clause	Amended/Revised Clause
			<p>executed/delivered and accepted Works/service(as the case may be), which the Corporation is entitled to recover as per clause no. 7.7 (Compensation for delay) provided an agreement for such alternate procurement from elsewhere, is made within (twelve) 12 months of the letter of cancellation sent to the Contractor. The Contractor shall not be entitled to any gain on such procurement made on account of default. The manner and method of such alternate procurement shall be at the entire discretion of the Corporation, whose decision shall be final. This right shall be without prejudice to the right of the Corporation, to recover the damages for breach of Contract by the Contractor as provided in the Contract or under the general law.</p>
10.	17.8.1 ii) a)	<p>All questions and disputes relating to the meaning of the specifications, designs, drawings and instructions herein before contained in this Contract or as to the quality of the workmanship or materials used on the work or arising out of the terms and conditions of the Contract whether during the progress of the work or after the completion or abandonment thereof, at the request of the aggrieved party in writing, shall be referred to the sole arbitration of the person and appointed by the Chairman & Managing Director, Nuclear Power Corporation of India Ltd, in respect of the contracts entered for and on behalf of the Corporation, by any</p>	<p>Except as otherwise provided in the contract, all disputes, differences, questions or disagreements shall, at any time, hereafter arises between the parties hereto or the respective representatives or assigns in connection with or arising out of the contract, or in respect of meaning of specifications, design, drawings, schedule, annexures, orders, instructions, the construction, interpretation of this agreement, or anything hereunder containing or arising hereunder or as to rights, liabilities or duties of the said parties hereunder or any matter whatsoever incidental to this contract or otherwise concerning the works of execution or failure to execute the same whether during the progress of work or stipulated/extended period or before or after the completion or abandonment thereof shall be referred to the sole arbitration (<i>for Contracts costing upto Rs. 10 Crores</i>) of the person appointed through mutual consent of both the parties at the time of dispute <i>or Committee of Arbitrators (for Contracts costing over Rs. 10 crores) as the case may be.</i></p> <p><i>For case of Contracts costing upto Rs. 10 Crores:</i></p> <p>If the parties fail to reach to a consensus regarding the appointment of the person as the sole Arbitrator through mutual consent within 30 days from the date of such request, the party shall seek the intervention of the court of</p>

S. No.	GCC Clause ref. no.	Existing Clause	Amended/Revised Clause
		Officer / Authority of the Corporation.	competent jurisdiction under Section 11 of the Arbitration and Conciliation Act, 1996 for the appointment of Sole Arbitrator. If the arbitrator to whom the matter is originally referred dies or refuses to act or resigns for any reason from the position of arbitrator, it shall be lawful for the parties to appoint another person through mutual consent to act as an arbitrator in the manner aforesaid. Such person shall be entitled to proceed with the reference from the stage at which it was left by his predecessor if both the parties consent to this effect, failing which the arbitrator will be entitled to proceed de-novo.
11.	17.8.1 ii) h) (New Clause)	—	In an arbitration invoked at the instance of either party to the contract, the arbitrator would be free to consider the counter claim of the other party even though they are not mentioned in the reference of arbitration.
12.	17.8.1 ii) i) (New Clause)	—	The award of the arbitrator shall be final and binding on the parties to the Contract.
13.	17.8.1 iii) (New Clause)	—	For contracts with CPSEs, Government Departments /Organizations: Except as otherwise provided in the contract, in the event of any dispute or difference relating to the interpretation and application of the provisions of commercial contract(s) between Central Public Sector Enterprises(CPSEs)/ Port Trusts inter se and also between CPSEs and Government Departments/ Organizations(excluding disputes relating to Railways, Income Tax, Custom & Excise Departments), such dispute or difference shall be taken up by either party for its resolution through AMRCD(Administrative Mechanism for Resolutions of CPSEs Disputes) as mentioned in DPE OM No. 05/0003/2019-FTS-10937 Dated: 14 December, 2022 & the decision of AMRCD on the said dispute will be binding on both the parties.

SECTION V
TECHNICAL SPECIFICATIONS

SECTION V**TECHNICAL SPECIFICATIONS****CONTENTS**

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CHAPTER - I

1.0 EXCAVATION, FILL AND BACKFILL:

1.1 SCOPE OF WORK

The scope of work covered under this specifications pertains to excavation of foundations, trenches, pits and over areas, in all sorts of soils, soft and hard rock, correct to dimensions given in the drawing including shoring, protections of existing underground utilities if any, such as water lines, electric cables etc., dewatering and shoring if necessary, stacking the useful materials as directed within the lead specified, refilling around the foundation and into plinth with selected useful excavated earth and finishing the surface to proper levels, slopes and camber etc., all complete.

1.2 SITE CLEARANCE

Before the earth work is started the area coming under cutting and filling shall be cleared of all obstructions, loose stones, shrubs, rank vegetation, grass ,brush-wood ,trees and saplings of girth upto 30 cm. measured at a height of one meter above ground and rubbish removed upto a distance of 150 meters outside the periphery of the area under clearance. The roots of trees shall be removed to a minimum depth of 60cm. below ground level, or a minimum of 30cm.below formation level whichever is lower, and the hollows filled up with earth, levelled and rammed. This work is deemed to be included in the earth work items and no separate payment will be admissible for the work.

The trees of girth above 30cm. measured at a height of one meter above ground, shall only be cut after permission of the Engineer-in-charge is obtained in writing. The roots shall also be removed as described in the preceding sub-para. Any material obtained from the site will be the property of the Department and the useful materials as decided by the Engineer-in-charge will be conveyed and properly stacked as directed within the lead specified. The tree cutting and disposing charges are borne by the contractor.

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1.3 SETTING OUT AND MAKING PROFILES:

Masonry or concrete pillars shall be erected at suitable points in the area to serve as bench marks for the execution of the work. These bench marks shall be connected with G.T.S. or any other permanent bench mark approved by the Engineer-in-charge. Necessary profiles with pegs, bamboos and strings or Burjis shall be made to show the correct formation levels before the work is started. The contractor shall supply labour and materials for setting out and making profiles and Burjis for the work at his own cost and the same shall be maintained during the excavation work. The department will show grid Co-ordinate or other reference points. It shall be the responsibility of the contractor to set out centre lines correctly with reference to the drawings and install substantial reference marks. Checking of such alignment by the Department will not absolve the contractor from his responsibility to execute the work strictly in accordance with the drawings.

1.4 EXCAVATION:

The contractor shall notify the Engineer-in-charge before starting excavation and before the ground is disturbed, to enable him to take existing levels for the purpose of measurements. The ground levels shall be taken at 5 to 15 meters intervals in uniformly sloping ground and at closer distance where local mounts, pits or undulations are met with ,as directed by the Engineer-in-charge. The ground levels shall be recorded in field books and plotted on the plans, which shall be signed by the Contractor and the Engineer-in-charge, before the earth work is actually started. The labour required for taking levels, shall be supplied by the contractor at his own cost. The contractor shall perform excavation in all types of soils, murrum, soft and hard rock, boulders etc., in foundation , over areas and in trenches to widths, lines, levels, grades and curves as shown in the drawing or lesser widths, lines and levels as directed by the Engineer-in-charge and as per items in the schedule of quantities.

1.5 Classification of Earth work: The earth work shall be classified under the following main categories and measured separately for each category.

- a) All types of soils, murrum, boulders.
- b) Soft rock
- c) Hard rock.

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1.5.1 a) All types of soils, Murrum, Boulders.: This includes earth, murrum, top deposits of agricultural soil, reclaimed soil, clay, sand or any combination thereof and soft and hard murrum, shingle etc., which is loose enough to be removed with spades, shovel and pick axes. Boulders not more than 0.03 cum. In volume found during the course of excavation shall also fall under this classification.

b) Excavation in soft rock: This shall include all material which are rock or hard conglomerate, all decomposed weathered rock, highly fissured rock, old masonry, boulders bigger than 0.03cum.in volume but not bigger than 0.5cum.and other varieties of soft rock which can be removed only with pick axes, crow bars, wedges and hammers with some difficulty. The mere the fact the contractor resorts to blasting and /or wedging and chiseling for reasons of his own, shall not mean the rock is classified as hard rock.

c) Excavation in Hard Rock: This includes all rock other than soft rock mentioned in para 1.51(b) viz.soft rock, occurring in masses, boulders having approximate volume more than 0.5cu.m.plain or reinforced cement concrete, which can best be removed by chiseling and wedging:

i) Excavation in Hard Rock by Chiselling and Wedging:Where Blasting is not permitted and if the Engineer-in-charge so desires, the excavation shall be done by chiselling and wedging or any other agreed method.

NOTE: All the excavated hard rock obtained shall be stacked properly and neatly within the specified lead by the contractor as directed by the Engineer-in-Charge.

1.6 Excavation: The excavation under all classifications in areas in trenches or in pits shall be carried out systematically. Cutting shall be done from top to bottom and no under – pinning or undercutting will be allowed. The bottom and sides of excavation shall be dressed to proper level, slopes, steps, camber etc., by removing high spots, and ramming thoroughly as directed by the Engineer-in-charge.

All the excavation shall be carried out strictly to the dimensions given in the drawing .The width shall generally be of the width of mudmat concrete and depth as shown in drawing or as directed by the Engineer-in-charge, according to availability of the

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desired bearing capacity of soil below .Any excavation if taken below the specified depths and levels, the contractor shall at his own cost fill up such over cut to the specified level with cement concrete 1:4:8 in case of excavation in all types of soils and with cement concrete 1:2:4 in case of excavation in soft and hard rock.

After the excavation is completed, the contractor shall notify the Engineer-in-Charge to that effect and no further work shall be taken up until the Engineer-in-charge has approved the depth and dimensions and also the nature of foundation materials. Levels and measurements shall also be recorded prior to taking up any further work.

1.7 SHORING: Unless separately provided for in the schedule of quantities, the quoted rate for excavation shall include excavation of slopes to prevent falling in soil by providing and /or fixing, maintaining and removing of shoring, bracing etc., The contractor would be responsible for the design of shoring for proper retaining of sides of trenches, pits etc., with due consideration to the traffic, superimposed loads etc., shoring shall be of sufficient strength to resist the pressure and ensure safety from slips and to prevent damage to work and property and injury to persons. It shall be removed as directed after items for which it is required are completed. Should the slips occur, the slipped material shall be removed and slope dressed to a modified stable slope. Removal of the slipped earth will not be measured for payment.

1.8 DEWATERING: Unless specifically provided for as separate item in the schedule of quantities, rate shall also include bailing or pumping out all water which may accumulate in the excavation during the progress of further works such as mud mat concrete, R.C.footings, shuttering etc., either due to seepage, springs, rain or any other cause and diverting surface flow by bunds or other means. Care shall be taken to ensure that the water discharged sufficiently away from the foundations to keep it free from nuisance to other works in the neighborhood.

1.9 DISPOSAL OF EXCAVATED MATERIALS:

- a. ANTIQUITES:** Any finds of archaeological interest such as relics of antiquity, coins, fossils or other articles of value shall be delivered to the Engineer-in-Charge and shall be the property of the Government.

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- b. USEFUL MATERIALS:** Any material obtained from the excavation which in the opinion of the Engineer-in-charge is useful. Shall be stacked separately in regular stacks as directed by the Engineer-in-Charge and shall be the property the Government.

No material excavated from foundation trenches of whatever kind they may be are to be placed even temporarily nearer than about 3 m from the outer edge of excavation. Discretion of the Engineer-in-Charge in such case is final .All materials excavated will remain the property of the Department Rate for excavation includes sorting out of the useful materials and stacking them separately as directed within the specific lead.

Materials suitable and useful for backfilling or other use shall be stacked in convenient place but not in such a way as to obstruct free movement of materials. Workers and vehicles or encroach on the area required for constructional purposes. It shall be used to the extent required to completely backfill the structure to original ground level or other elevation shown on the plan or as directed by the Engineer-in-Charge. Materials not useful in anyway shall be disposed off, levelled and compacted as directed by the Engineer-in-charge within a specified lead. The site be left clean of all debris and levelled on completion.

1.10 BACKFILLING INSIDES OF FOUNDATION S, PLINTH, UNDER FLOOR ETC.,

The back filling shall be done after the concrete or masonry has fully set and shall be done in such a way as not to cause under-thrust on any part of the structure. Where suitable excavated material is to be used for back filling, it shall be brought from the place where it was temporarily deposited and shall be used in backfilling. The scope of work for back filling/filling in foundation, plinth, under floors etc., shall include filling for all the buildings covered under the contract .Surplus earth available from one building if required, shall be used for backfilling /filling for other buildings also within the specified lead mentioned in the item. All the excavated soil are to be used for backfilling (except hard rock) areas as directed without any extra cost.

All timber shoring and form work left in the trenches, pits, floors etc., shall be removed after their necessary ceases and trash of any sort shall be cleared out from

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the excavation. All the space between foundation masonry or concrete and the sides of excavation shall be backfilled to the original surface with approved materials in layers not exceeding 150mm in thickness, watered and well consolidated by means of rammers to at least 90% of the consolidation obtainable at optimum moisture content (Protocol density). Flooding with water for consolidation will not be allowed. Areas inaccessible to mechanical equipment such as areas adjacent to walls and columns etc., shall be tamped by hand rammer or by hand held power rammers to the required density. The backfill shall be uniform in character and free from large lumps, stones, shingle or boulder not larger than 75mm. in any direction, salt, and clods, organic or other foreign materials which might rot. The backfilling in plinth and under floors shall be done in similar way in layers not exceeding 150mm thick and shall be well consolidated by means of mechanical or hand operated rammers as specified to achieve the required density.

1.11 FILLING IN PLINTH AND UNDER FLOORS.

After the available suitable excavated materials are exhausted as backfilling, the contractor shall notify the Engineer-in-charge of the fact and levels taken jointly with Engineer-in-Charge. The earth, murrum, sand, gravel etc. or such material suitable for filling proposed to be filled under floors and so mentioned in the item of schedule of quantities shall then be brought to site from approved locations and sources.

- i) **Earth filling:** The earth, soft murrum etc., so brought shall be filled up in layers of 15cm depth, each layer being well watered and consolidated by approved hand or mechanical tampers or other suitable means to achieve the required density.
- ii) **Gravel or Sand Filling:** gravel if required under floors, shall be single washed gravel of approved quality and of size varying from 12 mm to 20 mm. it shall be uniformly blended with approved type of soil and/or sand to obtain full compaction. Gravel shall be filled in specified thickness shall be well watered and rammed entirely to the satisfaction of the Engineer-in-Charge

If sand is required to be filled under floors, it shall be as clean, medium grained and free from impurities. The filled in sand shall be kept flooded with water for 24 hrs. to

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ensure maximum consolidation. Any temporary work required to maintain sand under flooded condition shall be done by the contractor at his own cost. The surface shall then be well dressed and got approved from Engineer-in-Charge before any other is taken over the fill.

1.12 MODE OF MEASUREMENTS:

1.12.1 All excavation in areas of pits trenches etc., shall be measured net. The dimensions for the purpose of payment shall be reckoned on the horizontal area of the excavation at the base for foundations of the walls, columns, footings, rafts or other foundations, multiplied by the mean depth from the surface of ground determined by levels. Excavation for side slopes will not be paid for.

Reasonable working space beyond concrete dimension required for waterproofing and shuttering where considered necessary in the opinion of Engineer-in-Charge will be allowed in execution and considered for payment for underground water tank, sump ,septic tank etc.,

1.12.2 Wherever direct measurements of rock excavation are not possible, volume of rock be calculated on the basis of length, breadth and depth of stacks made at site. The net volume shall be worked out by reducing it by 50%, taking the voids into consideration as 50%.

1.12.3 The rate for excavation shall include caring and disposing and leveling the excavated materials within the specified lead. The rate shall also be inclusive of cost of all tools, plants, explosive, shoring, dewatering at various stages, Labour, materials etc., to complete all the operations specified.

1.13.4 The backfilling and consolidation insides of foundation and in plinth with excavated material will not be paid for separately. The rate quoted for excavation shall be deemed to have been included the cost of stacking of excavated materials, conveying within the specified lead, picking of selected stacked materials, conveying it to the place of final backfill, compaction to the required proctor density as per relevant IS.

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1.12.5 Payment for filling and consolidation inside the trenches, sides of foundations, plinth etc., with selected materials brought by the contractor other than the excavated material shall be paid for separately as per the rates in schedule of quantities which includes cost of such materials/excavation, royalty, its conveyance within the specified lead, watering, consolidating, dressing etc., Actual quantity of consolidated filling shall be measured and paid in cubic meters upto three places of decimal. All the excavated soil as per relevant item shall be used for back filling (Except hard rock) by adopting back filling procedure without any extra cost.

1.12.6 The rate quoted in cum. For item of excavation is deemed to include the necessary additional quantity of excavation involved beyond the plan dimensions of the work which may be necessary to be carried out for carrying out the work in an engineering manner, decided upon by the contractor . Therefore no extra payment will be made for any excavation done other than the required quantity as per the plan dimension indicated in the drawings.

1.12.7 Measurements for excavation over area shall be determined by level or by “Dead men” or both at the discretion of the Engineer-in-charge. If however the Engineer-in-Charge decides on measurement by levels, levels of site shall be jointly taken and recorded by the Engineer-in-Charge or his representatives and the contractor, before commencement of the work and after completion of the work and the quantity of work done shall be computed based on these levels. The volume of earth work shall be computed based on “Simpsons formula” or any other approved method at the discretion of the Engineer-in-Charge.

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Chapter – II

ANTITERMITE TREATMENT

1.1 GENERAL:

Preconstructional anti-termite treatment is a process in which soil treatment is applied to a building in early stages of construction. The purpose of antitermite treatment is to provide the building with a chemical barrier against the subterranean termites.

Antitermite treatment being a specialized job, calls for thorough knowledge of the chemicals soils, termite to be dealt with and the environmental conditions, in order to give effective treatment and lasting protection to the property undergoing treatment. It is, therefore imperative that the works of antitermite treatment should be got executed through specialized agencies only. The specialized agency should be preferably a member of the Indian Pest Control Association and shall have sufficient experience of carrying out similar works of magnitude envisaged in this tender.

The preconstructional soil treatment is required to be applied during the construction stages of the sub-structure upto plinth level. The contractor has to be watchful of the various stages of sub-structure works and arrange to carry out the soil treatment in time after proper co-ordination with department and other contractors if any, working at site.

1.2 SCOPE:

The scope of preconstructional antitermite treatment covers the soil treatment with approved chemicals in water emulsion in foundation trenches in top surfaces of plinth filling, at junction of walls and floor, in expansion joints etc., in stages as detailed in this specifications and drawings. Unless otherwise stipulated, the antitermite treatment will be carried out as per I.S.6313 (Part II) of latest version and/or as per direction of the Engineer-in-Charge.

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1.3 SITE PREPARATION

In order to ensure uniform distribution of the chemical emulsion and to assist penetration, the following site preparation shall be carried out.

- a) Remove all tress, stumps, logs or roots from the building site.
- b) Remove all concrete form work if left anywhere, levelling pegs, timber off-cuts and other builder's debris from the area to be treated.
- c) If the soil to be treated is sandy or porous, preliminary moistening will be required to fill capillary spaces in soil in order to prevent the loss of emulsion through piping or excessive percolations.
- d) In the event of water logging of foundation the water shall be pump out before application of chemical emulsion and it should be applied only when the soil is absorbent.
- e) On clays and other heavy soils where penetration is likely to be slow and on sloping sites, where run-off of the treating solution is likely to occur ,the surface of the soil should be scarified to a depth of 75mm at least.
- f) All sub-floor levelling and grading should be complete all cutting, trenches and excavations should be completed with backfilling in place, borrowed fill must be free from organic debris and shall be well compacted. if this is not done supplementary treatments should be made to complete the barrier.

1.4 CHEMICAL TO BE USED

The effectiveness of chemical depends upon the choice of the chemical, the dosage adopted and the thoroughness of application. The chemical solutions or emulsion are required to be dispersed uniformly in the soil and to the required strength so as to form an effective barrier which is lethal and repellent to termites.

Soil Treatment: One of the following chemical in water emulsion, after approval from the Engineer-in-Charge, shall be used uniformly over the area to be treated.

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Chemical	% Concentration of Chemical by Weight in the water emulsion
i) Chlorphyriphos 20 EC emulsifiable concentrates (I.S. 8944-1974) :	1.0
ii) LINDANE 20EC (IS-632) :	0.5

The contractor should produce voucher(s) for the chemical purchased and should get verified the sealed container(S) of the specified chemical from the Engineer-in-Charge before preparing the emulsion/use for the treatment.

1.5 MODE AND RATE OF APPLICATION:

The chemical emulsion as stated above will be applied uniformly by sprayers at the prescribed rates as detailed below in all stages of the treatment.

1.5.1 Treatment on Top Surface of Plinth Filling: The top surface of the filled earth within plinth walls shall be treated with chemical emulsion at the rate of 5 liters/sqm. Of the surface area before sub-base to floor is laid. If filled earth has been well rammed and the surface does not allow the emulsion to seep- through, holes upto 50 to 75 mm.deep at 150 mm centers both ways shall be made with crow bars on the surface to facilitate saturation of the soil with emulsion.

1.5.2 Treatment at junction of walls and floors: Special care shall be taken to establish continuity of the vertical chemical barrier on the inner wall surface from the finished ground level (or from level where the treatment had stopped) upto the level of the filled earth surface. To achieve this a small channel 30 x30 mm.shall be made at all the junctions of wall/column with floor (before laying sub-grade) and rod holes made in the channel upto the finished ground level at 150mm apart and the iron rod moved backward and forward to break the earth and chemical emulsion poured along the channel @7.5 liters (or at recommended quantity) per sqm. of the vertical wall/column surfaces so as to soak the soil right upto the bottom. The soil shall be tamped back into place after this operation.

1.5.3 Treatment for Expansion Joints: The soil beneath the expansion joints shall receive special attention when the treatment under 1.5.1 above is in progress.

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This treatment shall be supplemented by treating through the expansion joint after sub-grade has been laid at the rate of 2 liters per metre length of expansion joint.

1.6 PRECAUTIONS DURING TREATMENT:

- a) Utmost care shall be taken to see that the chemical barrier is complete and continuous. Each part of the area shall receive the prescribed dosage of chemical emulsion.
- b) The treatment should not be carried out when it is raining or when the soil is wet with rain or sub-soil water.
- c) Once formed the treated soil barrier shall not be disturbed. If by chance, treated soil barriers are disturbed, immediate step shall be taken to restore the continuity and completeness of the barrier system.

1.7 PRECAUTIONS FOR HEALTH HAZARDS AND SAFETY MEASURES:

All the chemical mentioned above are poisonous and hazardous to health. These chemical can have an adverse effect upon health when absorbed through the skin, inhaled as vapors or spray mist or swallowed. Persons handling or using these chemical should be warned of these dangers and advised that absorption through the skin is the most likely source of accidental poisoning. They should be cautioned to observe carefully the safety precautions given in 1.7.2 to 1.7.4 particularly when handling these chemical in the form of concentrates.

1.7.1 These chemicals are usually brought to the site in the form of emulsifiable concentrates. The containers should be clearly labeled and should be stored carefully so that children and pets cannot get at them. They should be kept securely closed.

1.7.2 Particular care should be taken to prevent skin contact with concentrates. Prolonged exposure to dilute emulsions should be avoided. Workers should wear clean clothing and should wash thoroughly with soap and water specially before eating and smoking. In event of severe contamination, clothing should be

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removed at once and the skin Washed with soap and water. If chemicals splash into the eyes they shall be flushed with plenty of soap and water and immediate medical attention should be sought.

1.7.3 The concentrates are soil solutions and present a fire hazard owing to the use of petroleum solvents. Flames should not be allowed during mixing.

1.7.4 Care should be taken in the application of chemicals/soil-toxicants to see that they are not allowed to contaminate wells or springs which serve as source of drinking water.

1.8 GUARANTEE:

The contractor has to furnish the guarantee for 10 (ten) years from the date of completion of contract, stating that in case of reappearance of termites within the buildings area due to defective materials or workmanship or due to any other reasons, the contractor will carry out the necessary post constructional treatment to keep the entire area free from termite, once again, with out any extra cost to the Department during the guarantee period.

1.9 MODE OF MEASUREMENT:

The payment will be made on the basis of plinth area measurements at ground floor all the stages of treatment in sqm. Correct to two places of decimals. Rate includes the cost of material, Labour and all tools, plants, sprayers required for complete operation.

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Chapter-III

WET MIX MACADAM SUB-BASE/BASE

1.0 WET MIX MACADAM SUB-BASE/BASE

1.1 Scope

This work shall consist of laying and compacting clean, crushed, graded aggregate and granular material, premixed with water, to a dense mass on a prepared sub grade/sub-base/base or existing pavement as the case may be in accordance with the requirements of these Specifications. The material shall be laid in one or more layers as necessary to lines, grades and cross-sections shown on the approved drawings or as directed by the Engineer.

1.2 Execution of work :

Work shall be carried out in accordance with the Clause No.:406 of Specifications for road and bridge works (Latest version) Published by the IRC on behalf of the Govt. of India, Ministry of shipping, Road Transport & Highways

1.3 Measurements for Payment

Wet mix macadam shall be measured as finished work in position in cubic metres.

1.4 Rates

The Contract unit rate for wet mix macadam shall be payment in full for carrying out the required operations including full compensation for all components listed in Clause 1.4

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Chapter - IV

REINFORCED CONCRETE AND ALLIED WORKS

1. SCOPE

This specification covers the general requirements for concrete to be used on jobs using on-site production facilities including requirements in regard to the quantity, handling, storage of ingredients, proportioning, batching, mixing and testing of concrete and also requirements in regard to the quality. This also covers the transportation of concrete from the mixer to the place of final deposit and the placing, consolidation, curing, protecting, repairing and finishing of concrete.

In the event that state, city or other government bodies have requirements more stringent than those set forth in this specification, such requirements shall be considered part of this specification and shall supersede this specification where applicable.

2. CONCRETE (PLAIN AND REINFORCED)

The quality of materials and method and control of manufacture and transportation of all concrete work in respect of mix, whether reinforced or otherwise, shall conform to the applicable portions of these specifications.

The Engineer-in-Charge shall have the right to inspect the sources of materials, the layout and operation of procurement and storage of materials, the concrete batching and mixing equipments and the quality control system. Such an inspection shall be arranged by the contractor and the Engineer-in-Charge approval shall be obtained prior to starting the concrete work.

Materials for standard Concrete: The ingredients to be used in the manufacture of concrete shall consist solely of a standard type Portland / Portland Pozzolana cement, clean sand / manufactured sand, natural coarse aggregate, clean water, ice and admixtures if specially called for on drawings or schedule of quantities.

Unless otherwise specified all testing and qualification of concrete mix qualification, qualification of concrete ingredients and the batch tests on concrete and other construction materials shall be done by contractor by establishing the testing facility at site at his cost or from the list of Approved laboratories available at QA, KKNPP.

2.1 Cement

Cement proposed to use for construction work shall be from approved source.

Following are the qualified sources of cement and pre qualification/ source qualification is **not required** for these sources. Contractor is free to qualify the new sources other than mention below at his own cost as per approved procedure.

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SI No	Type of cement	Details of qualified sources
1	OPC 43 & 53 Grade Cement and PPC cement	1. India Cement, Tirunelveli. 2. Ramco Cement, Alathiyur/Ariyalur 3. Chettinad Cement, Puliur/Karikali 4. Dalmia Cement, Ariyalur 5. Ultra Tech Cement

The cement used shall be any of the following and the type selected should be appropriate for the intended use:

- a. Ordinary Portland cement conforming to IS 269
- b. Portland pozzolana cement(fly ash based) conforming to IS 1489(part I)

Unless otherwise specified or called for by the Engineer-in-charge, cement shall be ordinary Portland cement or/and Portland puzzolana cement in 50 kg bags.

The contractor will have to make his own arrangements for the storage of adequate quantity of cement as specified in the IS 4082. The storage arrangement shall be got approved by the Engineer-in-charge. Consignments in cement shall be stored as received and shall be consumed in the order of their delivery. Cement held in store for a period of ninety (90) days or longer shall be retested before use in the work.

PPC cement is permitted to use upto below ground level structures and to use above ground level structures is not permitted.

2.2 Cement Batch Qualification

The cement procured from the NPCIL approved sources will be accepted based on manufactures certificate. Contractor shall submit the manufacturer certificate to NPCIL for every batch/ week of cement received at site for acceptance before releasing for production of concrete or any other construction work. The cement will be released for construction on meeting the 3 days compressive strength of respective grade and other parameters mentioned in the manufacturer test certificate. Prior approval should be obtained from NPCIL for change / mixing of different brands of cement in a single pour.

2.3 Aggregates

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“Aggregate” in general designates both fine and coarse inert materials used in the manufacture of concrete.

- “Fine Aggregate” is aggregate most of which passes through 4.75 mm I.S sieve.
- “Coarse Aggregate” is aggregate most of which is retained on 4.75mm I.S sieve.

Following are the probable sources of rock-quarry, and their approximate distance from KKNPP site. Contractor shall qualify the source before put into use.

Sl.No.	Source	Distance (appx)
1.	Erukkanthurai	15Km
2.	Vadakankulam	30Km
3.	Kumbikulam	35Km
4.	South Karunkulam	25Km
5.	Kavalkinaru	35Km

Contractor can identify any other source for use. Contractor shall ascertain the availability of material in these quarries and take samples for testing for conforming their technical parameters for NPCIL’s approval before use. Source material shall meet the following requirements.

Aggregate source qualification

Sl.No.	Activity / Test Requirement	Frequency	Applicable Code	Remarks
1	Petrographic analysis	New Source or change in quality of aggregate observed, one sample per source	IS: 383/ASTM C-295	Strained quartz < 20% by wt
2	Alkali reactivity Chemical method		IS:383/IS:2386	
3	Chloride content max.*	-do-	ASTM D-1411	0.04% by wt
4	Sulphate content max.	-do-	ASTM D-1411	0.40% by wt

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Sl.No.	Activity / Test Requirement	Frequency	Applicable Code	Remarks
5	Crushing value	per source	IS: 2386 IS: 383	30% max.
6	Abrasion value	-do-	-do-	Do
7	Impact value	-do-	-do-	-do-
8	Specific gravity (SSD condition)	-do-	NPC Spec/ IS: 2386	2.6 (For C.A.) 2.55(For F.A.)
12	Water absorption/ moisture Content	per source	- do-	3% max
14	Deleterious material	per source	IS: 2386 / IS: 383	No1&3 Refer table No.2&4
15	Organic impurity	per source	IS:2386/ IS: 383	No impurity

Notes: All the above tests shall be conducted to qualify the quarry or source of aggregates in the NPCIL approved laboratory.

However the coarse aggregate should meet the grading requirement specified in the IS 383 of respective size and elongation and flakiness index should not be more than 15% each. Fine aggregate should meet the requirements of Zone-II specified in the IS 383. Contractor shall conduct the sieve analysis/ grading of coarse and fine for and submit to the NPCIL for acceptance before production of concrete. Aggregates having a specific gravity below 2.6 (saturated surface dry basis) shall not be used without special permission of the Engineer-in-charge

Sieve analysis for coarse and fine aggregate shall be done daily and report shall be submitted to NPCIL.

2.4 Water

Water for concreting shall meet the following requirements and source qualification of the same shall be done before commencement of concreting work and submitted for approval of NPCIL. Contractor has to arrange the construction water supply from outside the premises of NPCIL township area.

Water used for both mixing and curing shall be clean and free from injurious amounts of oils, acids, alkalis, salt, sugar, organic materials or other substances that may be deleterious to the concrete or steel. Potable water is generally considered satisfactory for mixing and curing the concrete. The proposed construction water shall meet the following requirements.

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To neutralize 100 ml sample of water, using phenolphthalein as an indicator, it should not require more than 5 ml. of 0.02 normal NaOH. The details of test shall be given in IS:3025 (Part 22).

- To neutralize 100 ml sample of water, using mixed indicator as an indicator, it should not require more than 25 ml of 0.02 normal H₂SO₄. The details of test shall be as given in 8 of IS:3025 (Part 23).

Permissible limits of solids when tested in accordance with IS:3025 shall be as given below:

PERMISSIBLE LIMIT FOR SOLIDS IN WATER

Type of solids	Permissible Limit	Max.
Organic	IS 3025(Part 18)	200 mg/l
Inorganic	IS 3025(Part 18)	3000 mg/l
Chlorides (in Cl -)	IS 3025(Part 32)	200 mg/l
Sulphate (in SO ₄ -)	IS 3025(Part 24)	400 mg/l
Suspended matter		2000 mg/l.
Phenols, sugars and other organic surface active substances		≤10 mg/l
Water oxidizables		≤15 mg/l
pH		6-8 .

Contractor shall test the water sample used for the construction activity at the beginning of the work and at every 6 monthly once in NPCIL approved laboratory and report shall be submitted to NPCIL for acceptance. Proposed sample shall meet the following requirements.

2.5 Admixture

Chemical admixtures shall be used to suit requirement of the work. The Contractor shall procure all chemical admixtures. The Contractor shall arrange for pre-qualification of such admixtures to fulfill the requirements as specified in ASTM C-494, at his own cost.

2.6 General Requirements of Admixtures

Admixture shall conform to ASTM C-494 type G i.e. high range water reducing and retarding admixture.

The Contractor shall procure all chemical admixtures required in the specification. The Contractor shall ensure consistent behavior of proposed admixtures in concrete

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mixes and at all ambient temperatures likely to be experienced at project site throughout the year, and especially at the recommended placement temperatures. Contractor shall arrange for pre-qualification of such admixtures to fulfill the requirements specified in ASTM C-494 at his own cost. Base material of admixture shall be either **sulphonated naphthalene formaldehyde** or **poly carboxylic ether** only. Contractor shall use admixture only on approval of NPCIL.

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Admixture Qualification Tests

Sl.No.	Description of Test (as per ASTM C-494)	Acceptance values for Type G
1	Water Reduction as % of control mix	12 % minimum
2	Air entrainment	± 1 % of control mix
3	Initial setting time: Deviation from control At least Not more than	1:00 hour later 3:30 hours later
4	Final setting time Deviation from control: At least Not more than	-- 3:30 hours later
5	Compressive strength as % of control mix 1 day 3 day 7 day 28 day	125 % min 125 % min 115 % min 110 % min
7	Specific gravity at 25°C	Within ±0.02 of the value stated by manufacturer
8	Solid content	With ± 3% of the value stated by the manufacturer
9	Ph	7-8
10	Chloride content	0.2 % max
11	Infrared Spectrograph	Identification of base material of the admixture

2.7 Batch Qualification

Each batch of 25 MT (or lesser) of admixture shall be tested and qualified before use. All the tests, as given in Table above, except 1-day compressive strength and flexural strength, shall be conducted. Admixture shall be released only after meeting the specified requirements. In the event of tests failing to meet the specified requirements during batch qualification, the particular batch shall be rejected and removed from site.

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3. CONCRETE MIX DESIGN

All the grades of concrete proposed to be used for construction for RCC element shall be controlled concrete. Contractor shall make necessary arrangement for designing the concrete mix and conduct the trial at site using approved source of ingredients. Designed concrete should meet the durability conditions, minimum cement content and maximum water cement ratio specified in the drawing / specification. Design mix shall be as per guidelines given in the IS 10262 and wet concrete properties shall meet the requirement of concrete placement mode.

Contractor shall conduct laboratory trials and batching plant trials for each grade of concrete and mix design report shall be submitted to NPCIL for approval. NPCIL will not permit to establish batching plant inside township premises. Contractor has to make his own arrangement to establish the concrete batching plant outside the township premises. During the designing of concrete the workability retention period of concrete also shall be considered for transportation time of concrete from batching plant and site. All the concrete shall be designed for pump able concrete and preferably contractor shall make arrangements to do the concrete using pumps at all elevations.

Contractor shall establish the concrete testing laboratory at batching plant for day to day testing of concrete making materials. For routine concreting at site the specimens shall be cast at site and not at batching plant. Additional compressive strength testing facility shall be made at site location other than batching plant area for testing day to day specimens. All testing shall be done in the presence of NPCIL.

The requirement of concrete mix proportion is considered taking the exposure condition of KKNPP as 'extreme' as per IS 456: 2000 Section 2 (Table 5). Based on the above, the minimum cement content, maximum water cement ratio for the required grade of concrete is given below, which shall be used in the works.

Concrete – Table No.I

Type of Concrete structure	Grade of Concrete	Minimum Cement Content (kg/m ³)	Maximum Water Cement ratio	General workability slump* (mm)
All RCC, Precast beams, hatches, precast slabs	M35/20 M35/40	350 kg / m ³	0.40	125 ± 20
All RCC, Precast beams, hatches, precast slabs	M30/20 M30/40	350 kg / m ³	0.40	125 0

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3.1 Concrete Production Using Batching Plants/ Site Mixers

Contractor shall submit the details of plant proposed to deploy work for approval. Batching plant used for production of concrete shall use the approved concrete mix design and produced concrete shall meet the wet and hardened concrete properties of respective grade of concrete as per relevant IS.

Batching plant/ weigh batcher shall be calibrated before using it for production of concrete. All ingredients shall be weighed as per approved mix recipe. These proportions of cement, fine and coarse aggregates shall be maintained during subsequent concrete batching by means of weigh batchers conforming to I.S. 2722. The tolerance of batching plant scale/ weigh batcher shall be as follows.

1. Coarse and fine aggregate : +/-2%.
2. Cement : +/-1%.
3. Water and admixture : +/-1%.

Different sizes of coarse and fine aggregate shall be stacked in separate stock piles/ bins of batching plant. The accuracy of concrete batching plant / weigh batchers shall be periodically checked and report shall be submitted to NPCIL for acceptance before production of concrete. Contractor shall conduct the calibration of batching plants periodically and report shall be submitted to NPCIL. Prior intimation shall be submitted to NPCIL for witnessing the calibration activities.

3.2 Sampling And Strength Test of Concrete

Samples from fresh concrete shall be taken as per I.S. 1199 of latest version and cubes shall be made, cured and tested at 28 days in accordance with I.S. 516 of latest version.

Following samples frequency shall be followed.

For RCC concrete minimum one sample (6 cubes, 3 for 7 days and 3 for 28 days) for every 50 Cum of concrete or minimum one sample every week (based on concrete requirements) whichever is earlier. The compressive tests strength of the samples shall be the average of the strength of three specimens. The individual variation should not be more than (+/-) 15 percent of the average. Concrete specimens shall be cast at site and testing arrangements shall be made available at site premises.

3.3 Acceptance Criteria

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Compressive strength:

The concrete shall be deemed to comply with the strength requirements as specified in the clause 16.1 and table No- 11 of IS 456.

4. INSPECTION OF STRUCTURES

Immediately after stripping the form work all concrete shall be carefully inspected and any defective work or small defects either removed or made good before concrete has thoroughly hardened as instructed by the Engineer In Charge.

In case of doubt regarding the grade of concrete used or result of cube strength are observed to be lower than the designed strength as per specifications at 28 days, compressive strength test of concrete based on core test, ultrasonic test and or/ load test shall be carried out by the digital ultrasonic concrete tester by an approved agency as directed by the Engineer In Charge all at the cost of the contractor. All the testes shall be as per relevant IS code and in case these tests do not satisfy the requirements, the department will be at liberty to reject the concrete and the contractor at his own cost has to dismantle and re do the same or carry out such remedial measures as approved by the department.

5. PRE POUR INSPECTION

Before the concrete is actually placed in position, the inside of the form work shall be inspected to see that they have been cleaned and oiled. Temporary openings shall be provided to facilitate inspection especially at bottom of columns and wall forms, to permit removal of saw dust, wood shavings, binding wire, rubbish, dirt etc. opening shall be placed or holes drilled so that these materials and water can be removed easily. Such openings/holes shall be later suitably plugged.

All the reinforcement, Ep's and electrical embedded parts shall be checked as per drawing by contractor execution and QA persons before offering to NPCIL for checking and acceptance. Contractor also shall produced all relevant test certificate and manufacturer certificate for the material used for the work.

Approval by Engineer-in-Charge of any and all materials and work as required here in shall not relieve contractor from his obligations to product finished concrete in accordance with the drawings and specifications.

No concrete shall be placed in wet weather or on a water covered surface. Any Concrete that has been washed by heavy rain shall be entirely remove if there any sign of cement and sand having been washed away from the concrete mixture. To guard against damage which may be caused by rain, the work shall be covered with tarpaulins immediately after the concrete has been placed and compacted before leaving the work unattended. To avoid flow of water over/around freshly placed concrete, suitable drains and sumps shall be provided.

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6. TRANSPORTATION

All buckets, containers used for transporting concrete shall be mortar-tight. All means of conveyance shall be adopted to deliver concrete of the required consistency and plasticity without segregation or loss of slump whatever method of transportation is employed. Chute shall not be used to transport the concrete without the written permission of the Engineer-in-charge and concrete shall not be rehandled before placing.

Before any concrete is placed, the entire placing programme, consisting of equipment, layout proposed procedures and methods shall be submitted to Engineer-in-Charge and no concrete shall be of such size and design to ensure a practically continuous flow of concrete during depositing without segregation of materials, considering the size of the job and placement location.

Except when otherwise approved by Engineer-in-Charge, concrete shall be placed in the shuttering by shovels or other approved implements and shall not be dropped from a height more than 1.0m or handle in a manner which will cause segregation.

Placing by Pumping/Pneumatic Placers: Concrete may be conveyed and placed by mechanically operated equipment e.g. pumps or pneumatic placers, only with the written permission of Engineer-in-Charge. The slump shall be held to the minimum, necessary for conveying concrete by this method.

When pumping is adopted, before pumping of concrete is started, the pipelines shall be lubricated with one or two batches of mortar composed of one part cement and two parts sand. The concrete mix shall specially designed to suit pumping. Care shall be taken to avoid stoppages in work once pumping has started.

When pneumatic placer is used, the manufacturers advice on layout to pipeline shall be followed to avoid blockages and excessive wear. Restraint shall be provided at the discharge box to cater for the reaction at the end.

Manufacturers and advice shall be followed regarding concrete quality and all other related matters when pumping/pneumatic placing equipments are used.

Concrete in Layers: Concreting, once started, shall be continuous until the pour is completed. Concrete shall be placed in successive horizontal layers of uniform thickness ranging from 15 cm, to 90 cm, as directed by Engineer-in-Charge. These shall be placed as rapidly as practicable to prevent the formation of cold joints or planes of weakness between each succeeding layers within the pour.

7. COMPACTION

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Concrete shall be compacted during placing, with approved vibrating equipment, until the concrete has been consolidated to the maximum practicable density, if free of pockets of coarse aggregate and fits tightly against all for surfaces, reinforcement and embedded fixtures. Particular care shall be taken to ensure that all concrete placed against the form faces and into corners of forms or against hardened concrete at joints is free from voids of cavities. The use of vibrators shall be consistent with the concrete mix and caution to be exercised not to over vibrate the concrete to the point of segregation.

Bleeding or free water on top of concrete being deposited in to the forms shall be caused stop the concrete pour and the conditions causing this defect corrected before any further concreting is resumed.

8. CONSTRUCTION JOINTS AND KEYS

Concrete shall be placed without interruption until completion of the part of the work between predetermined construction joints as specified therein after. Time lapse between the pouring of adjoining units shall be as specified in the drawings or as directed by Engineer-in-Charge.

If stopping of concreting becomes unavoidable anywhere, a properly formed construction joint shall be made where the work is stopped. Joints shall be either vertical or horizontal, unless shown otherwise in drawing. In case of an inclined or curved member, the joints shall be right angles to the axis of the member. Vertical joints in walls shall be kept to a minimum. Vertical joints shall be formed against a stop board, horizontal joints shall be level and wherever possible, arranged, so that the joint lines coincide with the architectural features of the finished work. Battens shall be nailed to the form work to ensure a horizontal line and if directed, shall also be used to form a grooved joint. For tank walls, similar work joints shall be formed as per I.S. 3370. Concrete that is in the process of setting shall not be disturbed or shaken by traffic either on the concrete itself or upon the shuttering. Horizontal and vertical construction joints and shear keys shall be located and shall conform in detail to the requirements of the plans unless otherwise directed by Engineer-in-Charge.

9. CURING, PROTECTING, REPAIRING, AND FINISHING

9.1 Curing: All concrete shall be cured by keeping it continuously damp for the period of time required for complete hydration and hardening to take place. Preference shall be given to the use of continuous sprays or ponded water, continuously saturated covering of sacking, canvas, hessian or other absorbent materials, or approved effective curing compounds applied with spraying equipment capable of producing a smooth, even textured coat. The quality of curing water shall be the same as that used for mixing concrete. Fresh concrete

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shall be kept continuously wet for a minimum period of 14 days from the date of placing of concrete

9.2 Curing Compounds: Surface coating type curing compound shall be used only on special permission of Engineer-in-Charge. Curing compounds shall be liquid type while pigmented, conforming to U.S. Bureau of Reclamation Specification. No curing compound shall be used on surface where future blending with concrete, water or acid proof membrane or painting is specified. Use of Curing compound will be permitted only after due qualification and comparative study.

9.3 Repair and Replacement of Unsatisfactory Concrete

Immediately after the shuttering is removed, the surface of concrete shall be very carefully gone over and all defective areas called to the attention of Engineer-in-Charge who may permit patching of the defective areas or else reject the concrete unit either partially or entirely. Rejected concrete shall be removed and replaced by Contractor at no additional expense to the Department. Holes left by form bolts etc. shall be filled up and made good with mortar composed of one part of cement to one and half parts of sand passing through 2.36 mm. I.S. sieve after removing any loose stones adhering to the concrete. Mortar filling shall be struck off flush at the face of the concrete. Concrete surface shall be finished as described under the particular item of work.

Superficial honey combed surfaces and rough patches shall be similarly made good immediately after removal of shuttering, in the presence of Engineer-in-Charge and superficial water and air holes shall be filled in. The mortar shall be well worked into the surface with wooden float. Excess water shall be avoided. Unless instructed otherwise by Engineer-in-Charge, the surface of the exposed concrete placed against shuttering shall be rubbed down immediately on removal of shuttering to remove fine or other irregularities, care being taken to avoid damaging the surfaces. Surface irregularities shall be removed by grinding.

1. **Use of Epoxy:** The use of epoxy for bonding fresh concrete used for repairs will be permitted upon written approval of Engineer-in-Charge. Epoxies shall be applied in strict accordance with instruction f the manufacturer.
2. **Method of Repair:** Small size holes having surface dimensions about equal to the depth of the hole, holes after removal of form bolts, grout insert holes and slots cut for repair of cracks shall be repaired as follows:
 - a. **Curing of Patched Work:** The patched area shall be covered immediately with an approved non-staining water-saturated material such as gunny bags, which shall be kept continuously wet and protected against sun and wind for a period of 24 hours. Thereafter, the patched

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area shall be kept wet continuously by a fine spray of sprinkling water for not less than 10 days.

- b. Approval by Engineer-in-Charge:** All materials, procedures and operations used in the repair of concrete and also the finished repair work shall be subject to the approval of Engineer-in-Charge. All fillings shall tightly bonded to the concrete and shall be sound free from shrinkage cracks after the fillings have been cured and dried.

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10. FINISHING

This specification is intended to cover the treatment of concrete surfaces of all structures.

- 1. Finish for Formed Surfaces:** The type of finish for formed concrete surfaces shall be as follows, unless otherwise specified by the Engineer-in-charge.

For surfaces against which backfill or concrete is to be placed, no treatment is required except repair of defective areas.

For surfaces below grade, which will receive water proofing treatment, the concrete shall be free of surface irregularities which would interfere with proper application of the water-proofing materials which is specified for use.

Unless specified, surfaces which will be exposed when the structure is in service shall receive no special finish, except repair of damaged or defective concrete, removal of fins and abrupt irregularities, filling of holes left by form ties and rods and clean up of loose or adhering debris.

11. PREPARATION OF CONCRETE SURFACES

All concrete shall be protected against damage until final acceptance by Engineer-in-Charge and following procedures shall be followed for preparation of surfaces.

11.1 Foundation Bedding, Bonding and Jointing

All surfaces upon or against which concrete will be placed shall be suitably prepared by thoroughly cleaning, washing and dewatering as may be indicated in the plans or as Engineer-in-Charge may direct to meet the various situations encountered in the work.

Soft or spongy areas shall be cleaned out and back filled with either a soil cement mixture, lean concrete or clean sand fill compacted to minimum density of 90% Modified Proctor, unless otherwise mentioned in schedule of quantities.

Prior to construction of form work for any item where soil will not act as bottom form, approval shall be obtained from Engineer-in-Charge as to the suitability of the soil.

11.2 Preparation of Rock Strata of Foundations

To provide tight bond with rock foundations, the rock surface shall be prepared and the following general requirements shall be observed:

Concrete shall not be deposited on large sloping rock surface. Where required by Engineer-in-Charge or as indicated on the plans, the rock shall be cut to form rough steps or benches to provide roughness or a more suitable bearing surface.

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Rock foundation stratum shall be prepared by picking, barring, wedging and similar methods which will leave the rock in an entirely sound and un-shuttered condition.

Shortly before concrete is placed, the rock surface shall be cleaned with high pressure water and air jet even though it may have been previously cleaned in that manner.

Prior to placing concrete, the rock surfaces, the rock surface shall be kept wet for a period of 2 to 4 hours unless otherwise directed by the Engineer-in-Charge.

Before placing concrete on rock surfaces, all water shall be removed from depressions to permit through inspection and proper bonding of the concrete to the rock.

11.3 Preparation of Earth Strata of Foundations

All earth surfaces upon which or against which concrete is to be placed, shall be well compacted and free from standing water, mud or debris. Soft, yielding soils shall be removed and replaced with suitable earth and well compacted as directed by the Engineer-in-charge. Where specified, lean concrete shall be provided in the earth stratum for receiving concrete. The surface of absorptive soil against which concrete is to be placed shall be moistened thoroughly so that no moisture will be drawn from the freshly placed concrete and later shall help to cure the concrete.

11.4 Preparation of Concrete Surfaces

Preparation of concrete surface upon which additional concrete is to be placed later, shall preferably be done by scarifying and cleaning while the concrete is between its initial and final set. This method shall be used wherever practicable and shall consist of cutting the surface with picks and stiff brooms and by use of an approved combination of air and water jet as directed by Engineer-in-charge. Great care shall be taken in performing this work to avoid removal of too much mortar and the weakening of the surface by loosening of aggregate. When it is not practicable to follow the above method, it will be necessary to employ air tools to remove laitance and roughen the surface.

The final required result shall be a pitted surface from which all dirt, unsound concrete, laitance and glazed mortar have been removed.

12. CLEANING AND BONDING OF FORMED CONSTRUCTION JOINTS

Vertical construction joints shall be cleaned as specified above or by other methods approved by Engineer-in-charge. In placing concrete against formed construction joints, the surfaces of the joints, where accessible, shall be coated thoroughly with the specified bed-joint bonding mortar immediately before they are covered with concrete or by scrubbing with wire brooms, dipped into the fresh concrete. Where it

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is impracticable to apply such a mortar coating, special precautions shall be taken to ensure that the new concrete is brought into intimate contact with the surface of the joint by carefully puddling and spading with aid of vibrators and suitable tools.

13. EXPANSION AND CONTRACTION

Provision shall be made for expansion and contraction in concrete by use of special type joints located as shown in the drawings. Construction joint surfaces shall be treated as specified in the specifications, shown in the drawings or as directed by Engineer-in-charge.

14. FIRE PROTECTION SYSTEM

The contractor shall provide and maintain at all times an adequate fire protection system to protect his equipment materials and construction. In case of an emergency the contractor shall permit the Engineer-In-charge of use the system for protecting equipment works etc on the project.

15. FINISHING OF CONCRETE

General: Unless otherwise specified concrete finished shall conform to the following specifications:

Finish: F1, F2 and F3 shall describe formed surface

Finish: U1.U2 and U3 shall describe un-formed surface

Off sets or fins caused by disposed or misplaced form sheathing lining or form sections or by defective form lumber shall be referred to as abrupt irregularities. All other irregularities shall be referred to as gradual irregularities Gradual irregularities shall be measured as deviation from a plane surface with a template 1.5 m long for formed surface and 3 m long for unformed surfaces.

15.1 Formed Surfaces

Finish F1 - Shall apply to all formed surfaces for which finish F2 . F3 or any other special finish is not specified and shall include filling up all form tie holes.

Finish F2 - Shall apply to all formed surfaces so shown on the drawings or specified by the Engineer-in-charge. This shall include filling all form tie-holes repair of gradual irregularities exceeding 6 mm removal of ridges and abrupt irregularities by grinding.

Finish F3 - Shall apply to all formed surfaces exposed to view or where shown in the drawings or specified by the Engineer-in -charge. Finish F3 shall include all measures specified for Finish - F2 and in addition, Filling air holes with mortar and treatment of the entire surface with sack rubbed finish. It shall also include clean up

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of loose and adhering debris where a sack rubbed finish is specified the surfaces shall be prepared within two days after removal of the forms.

The surface shall be wetted and allowed to dry slightly before mortar is applied by sack rubbing. The mortar used shall consist of one part cement to one and half parts by volume of fine (minus NO.16 mesh) sand. Only sufficient mixing water to give the mortar a workable consistency shall be used. The mortar shall then be rubbed over the surface with a fine burlap or linen cloth so as to fill all the surface voids. The mortar rubbed in the voids shall be allowed to stiffen and solidity after which the whole surface shall be wiped clean so that the surface presents a uniform appearance without air holes irregularities etc.

Curing of the surface shall be continued for a period of ten (10) days.

15.2 Unformed Surfaces:

Finish U1 - shall apply to all unformed surfaces for which the finish U2, U3 or any other special finish is not specified and shall include screening the surface of the concrete to the required slope and grade. Unless the drawing specified a horizontal surface or shows the slope required the tops of narrow surfaces such as stair, treads, walls curbs and parapets shall be slopped approximately 10 mm per 300 mm width surfaces to be covered by backfill or concrete sub-floor to be covered with concrete topping terrazzo and similar surfaces shall be smooth screened and leveled to produce even surface irregularities not exceeding 6 mm.

Finish U2 - shall apply to all unformed surfaces as shown in the drawing or specified by the Engineer-in-charge and shall include screening and applying a wood float finish to the surface of the concrete to the required slopes and grade.

Repair of abrupt irregularities unless a roughened texture is specified. Repair of gradual irregularities exceeding 6 mm.

Finish U3 - Shall apply to unformed surfaces for which a high degree of surface smoothness is required, where shown the drawing or specified by the Engineer-in-charge. This shall include screeding floating and applying a steel trowel finish to the surface of the concrete to the required slopes and grade.

Repair of abrupt irregularities.

Repair of gradual irregularities exceeding 6 mm finishing joints and edges of concrete with edging tools.

15.3 Miscellaneous:

a) RCC lift well from bottom of lift well to FFL to be protected to avoid water entry in lift area by grouting using "Top inject 70 Polyurethane coat" of M/s Confix India Or

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equivalent types in M/s BASF Or PU Form injection from M/s Dr.Fixit makes. Joint guarantee for 10 years to be submitted for this work.

- b) For water tanks RCC Works such as Raft, Wall and slabs “Aquacrete” admixture of M/s ANN World Or equivalent in Ms Confix India Or M/s BASF Or Dr.Fixit makes to be used. The quote of RCC Works should include the above and there is separate payment will be made.

16. MODE OF MEASUREMENT FOR CONCRETE WORK

General: Concrete as actually done shall be measured for payment, subject to the following tolerance, unless otherwise stated hereinafter. Any work done extra over the specified dimensions shall not be measured for payment.

- Linear dimensions shall be measured in full centimeters except for the thickness of slab which shall be measured to the nearest half centimeters.
- Areas shall be worked out to the nearest 0.01 sqm
- Cubic contents shall be worked out to the nearest 0.001 cum
- The concrete shall be measured for its length breadth and height/depth limiting dimensions to those specified on drawings or as directed by the Engineer-in-charge.

NOTE:

The sizes of RCC members as assumed in the estimated are based on preliminary drawings and are likely to be changed. The contractor is not entitled to any extra claim due to such changes

Deductions:

No deductions shall be made for the following

- Ends of dissimilar materials e.g. joists, beams, posts, girders, rafters, purlins, trusses, corbels, steps etc upto 500 sq cm in cross section.
- Opening upto 0.1 sqm (1000 sq cm)
- Volume occupied by reinforcement.
- Volume occupied by pipes, conduits, sheathing, etc. not exceeding 25sq cm each I cross sectional area. Nothing extra shall be paid for leaving and finishing such cavities and holes.

i) Column Footing:

RCC in foundation and footings shall be measured for its length, breadth and depths limiting dimensions to those specified in drawing or as ordered in

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writing by the Engineer-in-charge. Incase of tapering portions of column footings the quantities shall be calculated by prismoidal formula.

ii) Column:

Column shall be measured from top of footings to the plinth level and from plinth level to the structural slab level and to the subsequent structural slab level. Measurements for higher grade concrete in columns as its junction with lower grade concrete beams shall be restricted to the column section supporting the beam in question.

iii) Wall:

All walls shall be measured from top of the wall footing to the plinth level and from plinth level to the top of structural first floor and to subsequent floors.

iv) Beam and Lintel:

Beams shall be measured from face to face of the columns, walls, cross beams including haunches if any. The depth of the beams shall be measured from the top of slab to the bottom of the beam except in the case of inverted beam where it shall be measured from top of slab to top of beams. The beams and lintels with narrow width even though acting as fascia in elevation in some cases will be measured as beams and lintels only.

v) Slab:

The length and breadth of slab laid to correct thickness as shown in the detailed drawings or as ordered by the Engineer-in-Charge shall be measured between beams, walls and columns.

vi) Chajjas, Facias, Fins and Mullions:

- a) Chajjas shall be measured net from supporting faces upto the edges of chajjas without any facia.
- b) Facia shall be measured full excluding chajja thickness.
- c) End fins shall be measured full.
- d) Intermediate fins, mullions shall be measured between chajjas or other supporting structure members.
- e) Parapets shall be measured from top of slab/chajjas.

vii) Staircase:

The concrete in all members of staircase like waist slabs, steps, cantilever steps, stringer beams etc. shall be measured for their length, breadth and

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depth, limiting dimensions to those specified on drawings. No deductions shall be made for embedded plugs, pockets.

Rates: The rate for P.C.C/R.C.C shall included the cost of all materials, labour, transport, lifts in all elevations of all storey heights, tools and plants etc all the operations mentioned hitherto, including or excluding the cost of form work and/or reinforcement as mentioned in the schedule of quantities. The rates also shall include the cost of testing materials, mix design, cube test and allied incidental expenses.

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Annexure-'I'

TABLE-I

QA PLAN, SCHEDULE AND TESTING REQUIREMENTS FOR CONCRETE & Ingredients

SI No.	Material	Test or inspection	Frequency	Reference Document	Acceptance document	Contractor's Responsibility		KKNPP Responsibility
						Performance	Verification	Execution
A	Concrete Ingredients	Source Qualification	Every new source	Technical Specification	Relevant Standards	External Lab	Contractor's QA	H
1.	Cement Batch acceptance	Physical Properties	For every week of cement	IS 4031	IS 262	Manufacturer certificate	Contractor's QA	S
		Chemical Properties	For every week of cement	IS 4032	IS 262	MTC by Manufacturer.	Contractor's QA /	R
2.	<u>Fine aggregates</u> Physical Properties	1. Grading – sieve analysis 2. Moisture content/	One sample per day Daily	IS 2386	NPCIL Specification	External Lab /or Site lab	Contractor's QA/	S
3.	<u>Coarse aggregate</u> Physical Property	i. Sieve analysis ii. Moisture absorption	One sample per day Daily	IS 2386	NPCIL Specification	External Lab / site lab	Contractor's QA/	S
4.	<u>Water</u>	Chemical properties	Once in 6 months	IS 456 & IS 3025	NPCIL Specification	3 rd party inspection by contractor	Contractor's QA/	R

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SI No.	Material	Test or inspection	Frequency	Reference Document	Acceptance document	Contractor's Responsibility		KKNPP Responsibility
						Perform- ance	Verification	Execution
5.	<u>Admixture</u> Physical properties	Physical properties	Acceptance of source and batch as per technical specifications	ASTM C-494	Qualification at site and technical literature	Submissions of relevant documents	Contractor's QA/	H
B	Concrete Mix <u>Mix design of concrete</u>	Mix Acceptance	Every new Grade	Technical Specification	Relevant Standards	External Lab/ site lab/at out sourced batching plant	Contractor's QA	H
		i) Design of mix. a) Workability at different Intervals to determine slump loss. ii) Conducting tests on hardened concrete	For every grade of concrete	IS 10262 and IS 456 and NPCIL Specification	NPCIL Spec. and IS456		Contractor's QA	
		Casting of specimen for compressive strength for 7 and 28 days	One sample per 50 M ³ of concrete	NPCIL Specification	NPCIL Specification	Contractor	Contractor's QA/	S
		Additional samples	Whenever required	IS - 516	NPCIL Specification	Contractor	Contractor's QA/	S

- R – Review point
- S – Surveillance point
- H–Holding point

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Chapter – V

FORM WORK

1.0 GENERAL:

The form work shall consist of shores, bracings, sides of beams and columns, bottom of slabs etc, including ties, anchors, hangers, inserts etc. complete which shall be properly designed and planned for the work. The false work shall be so constructed that up and down vertical adjustment can be made smoothly. Wedges may be used at the top or bottom of timber shores, but not at both ends, to facilitate vertical adjustment of dismantling of form work.

1.1 DESIGN OF FORM WORK:

The design and engineering of form work as well as its construction shall be the responsibility of Contractor. If so instructed, the drawings and calculations for the design of the form work shall be submitted well in advance to the Engineer-in-Charge for approval before proceeding with work, at no extra cost to the Department. Engineer-in-Charges approval shall not however, relieve Contractor of the full responsibility for the design and construction of the form work. The design shall take into account all the loads vertical as well as lateral that the forms will be carrying including live and vibration loadings.

1.2 TOLERANCES:

Tolerances is a specified permissible variation from lines, grade or dimensions given in drawings. No tolerances specified for horizontal or vertical building lines or footings shall be constructed to permit encroachment beyond the legal boundaries. Unless otherwise specified the following tolerances will be permitted:

1.2.1 Tolerances for R.C. Buildings:

- i) Variation from the plumb:

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- a) In the line and surfaces of columns, piers, walls and in buttresses: 5 mm. per 2.5m., but not more than 25 mm.

- b) For exposed corner columns and other conspicuous lines.

In any bay or 5 m. maximum: (+/-) 5 mm

In 10 m. or more: (+/-) 10 mm

- ii) Variation from the level or from the grades indicated on the drawings:

- a) In slab soffits, ceilings, beam soffits and in arrises.

In 2.5m: (+/-) 5 mm.

In any bay or 5m. maximum: (+/-) 8 mm.

In 10m. or more: (+/-) 15 mm.

- b) For exposed lintels, sills, parapets, horizontal grooves and other conspicuous lines

In any bay or 5. m. maximum: (+/-) 15 mm.

In 10 m or more: (+/-) 10 mm.

- iii) Variation of the linear building lines from established position in plan and related position of columns, walls and partitions.

In any bay or 5m. maximum: (+/-) 10 mm.

In 10 m. or more: (+/-) 20 mm.

- iv) Variations in the sizes and locations of sleeves, openings in walls and floors except in the case of and for anchor bolts: (+/-) 5 mm.

- v) Variation in cross-sectional dimensions of columns and beams and in the thickness of slabs and walls: (+)10 mm/(-)5 mm

- vi) Footings:

- a) Variation in dimensions in plan: (+)50mm./(-)5mm.

- b) Misplacement or eccentricity: 2% of footing within the direction of misplacement but not more than 50 mm.

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c) Reduction in thickness: (-) 5% of specified thickness subject to maximum of 50 mm.

vii) Variation in steps.

a) In a flight of stairs.

Raise: (+/-) 3.0 mm.

Tread: (+/-) 5.0 mm.

b) In consecutive steps.

Rise: (+/-) 1.5 mm.

Tread: (+/-) 3 mm.

Tolerances in other Concrete Structure:

A) All Structures:

i) Variation of the constructed linear outline from established position in plan.

In 5 m: (+/-) 10 mm.

In 10 m. or more: (+/-) 15 mm.

ii) Variation of dimensions to individual structure features from established positions in plan.

In 20 m. or more. (+/-) 25 mm.

In buried constructions: (+/-) 150 mm.

iii) Variation from plumb, from specified batter or from curved surfaces of all structures.

In 2.5 m.: (+/-) 10 mm.

In 5.0 m.: (+/-) 15 mm.

In 10.0 m.: or more (+/-) 25 mm.

In buried constructions: (+/-) Twice the above limits

Kudankulam Nuclear Power Project	Construction of 203 Nos of Residential Quarters comprising of 40 Nos of E-type (G+10 floor-1 Tower), 80 Nos of D-Special quarters (G+10 floor-2 Tower), 80 Nos of B-type quarters (G+10 floor-2 Tower) and 3 Nos of F Type quarters (G+1 floor) at Anuvijay Township
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- iv) Variation from level or grade indicated on drawings in slabs, beams, soffits, horizontal grooves and visible arises.

In 2.5 m: (+/-) 5 mm.

In 7.5 m. or more: (+/-) 10 mm.

In buried constructions: (+/-) Twice the above limits

- v) Variation in cross-sectional dimensions of columns, beams, buttresses, piers and similar members. (+) 10 mm/(-) 5mm.

- vi) Variation in the thickness of slabs, walls, arch sections and similar members. (+) 10 mm/(-) 5 mm.

B) Footings for columns, piers, walls, buttresses and similar members:

- i) Variation of dimensions of plan: (+)50 mm/(-) 10mm

- ii) Misplacement or eccentricity: 2% of footing within the direction of misplacement but not more than 50 mm.

- iii) Reduction in thickness: 5% of specified thickness subject to a maximum of 50 mm.

Tolerances in other types of structures shall generally conform to those given in Clause 2.4 of Recommended Practice for concrete form work (ACI 347).

1.3 TYPE OF FORM WORK:

Form work may be of timber, plywood, metal, plastic or concrete. For special finishes, the form work may be lined with plywood, steel sheets, oil tempered hard board etc. Sliding forms and slip forms may be used with the approval of Engineer-in-Charge. Wooden bamboos/poles will not be permitted.

1.4 FORMWORK REQUIREMENTS:

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Forms shall conform to the shapes, lines, grades and dimensions including camber of the concrete as called for in the drawings. Ample studs, waler braces, straps, shores etc. shall be used to hold the forms in proper position without any distortion whatsoever until the concrete has set sufficiently to permit removal of forms. Forms shall be strong enough to permit the use of immersion vibrators. In special cases, form vibrators may also be used. The shuttering shall be close boarded. Timber shall be well seasoned, free from sap, shakes, loose knots, worm holes, warps or other surface defects in contact with concrete. Faces coming in contact with concrete shall be free from adhering grout, plaster, paint, projecting nails, splits or other defects. Joints shall be sufficiently tight to prevent loss of water and fine material from concrete.

Plywood shall be used for exposed concrete surfaces, where called for. Sawn and wrought timber may be used for unexposed surfaces. Inside faces of forms for concrete surfaces which are to be rubbed finished shall be planed to remove irregularities or unevenness in the face. Form work with lining will be permitted.

All new and used from lumber shall be maintained in a good condition with respect to shape, strength, rigidity, water tightness, smoothness and cleanliness of surfaces. Form lumber unsatisfactory in any respect shall not be used and if rejected by Engineer-in-Charge shall be removed from the site.

Shores supporting successive stories shall be placed directly over those below or be so designed and placed that the load will be transmitted directly to them. Trussed supports shall be provided for shores that cannot be secured on adequate foundation.

Formwork during any stage of construction showing signs of distortion or distorted to such a degree that the intended concrete work will not conform to the exact contours indicated on the drawings, shall be repositioned and strengthened. Poured concrete affected by the faulty formwork, shall be entirely removed and the formwork corrected prior to placing new concrete.

Excessive construction camber to compensate for shrinkage settlement etc. that may impair the structural strength or members will not be permitted.

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Forms for substructure concrete may be omitted when, in the opinion of Engineer-in-charge, the open excavation is firm enough to act as the form. Such excavations shall be slightly larger than required by the drawings to compensate for irregularities in excavation and to ensure the design requirement.

Forms shall be so designed and constructed that they can be stripped in the order required and their removal do not damage the concrete. Face formwork shall provide true vertical and horizontal joints, conforming to the architectural features of the structure as to location of joints and be as directed by Engineer-in-Charge.

Where exposed smooth or rubbed concrete finishes are required, the forms shall be constructed with special care so that the desired concrete surfaces could be obtained which require a minimum finish.

BRACINGS, STRUTS AND PROPS:

Shuttering shall be braced, strutted, propped and so supported that it shall not deform under weight and pressure of the concrete and also due to the movement of men and other materials. Bamboos shall not be used as props or cross bracings.

The shuttering for beams and slabs shall be so erected that the shuttering on the sides of beams and under the soffit of slab can be removed without disturbing the beam bottoms.

Repropping of beams shall not be done except when props have to be reinstated to take care of construction loads anticipated to be in excess of the design load. Vertical props shall be supported on wedges or other measures shall be taken whereby the props can be gently lowered vertically while striking the shuttering.

If the shuttering for a column is erected for the full height of the column, one side shall be left open and built upon sections as placing of concrete proceeds, or windows may be left for pouring concrete from the sides to limit the drop of concrete to 1.0 m. or as directed by Engineer-in-Charge.

1.5 INSPECTION OF FORM WORK:

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Following points shall be borne in mind while checking during erection of form work and form work got approved by the Engineer-in-Charge before placing of reinforcement bars:

- a) Any member which is to remain in position after the general dismantling is done, should be clearly marked.
- b) Material used should be checked to ensure that, wrong items / rejects are not used.
- c) If there are any excavations nearby which may influence the safety of form works, corrective and strengthening action must be taken.
- d)
 - i) The bearing soil must be sound and well prepared and the sole plates shall bear well on the ground
 - ii) Sole plates shall be properly seated on their bearing pads or sleepers
 - iii) The bearing plates of steel props shall not be distorted.
 - iv) The steel parts on the bearing members shall have adequate bearing areas.
- e) Safety measures to prevent impact of traffic, scour due to water etc. should be taken. Adequate precautionary measures shall be taken to prevent accidental impacts etc.
- f) Bracing, struts and ties shall be installed along with the progress of form work to ensure strength and stability of form work at intermediate stage. Steel sections (especially deep sections) shall be adequately restrained against tilting, over turning and form work should be restrained against horizontal loads. All the securing devices and bracing shall be tightened.
- g) The stacked materials shall be placed as catered for, in the design.
- h) When adjustable steel props are used, they should:
 - i) be undamaged and not visibly bent.
 - ii) have the steel pins provided by the manufacturers for use.
 - iii) be restrained laterally near each end.
 - iv) have means for centralizing beams placed in the forkheads.

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- i) Screw Adjustment of adjustable props shall not be over extended.
- j) Double wedges shall be provided for adjustment of the form to the required position wherever any settlement/elastic shortening of props occurs. Wedges should be used only at the bottom end of single prop. Wedges should not be too steep and one of the pair should be tightened/ clamped down after adjustment to prevent their shifting.
- k) No member shall be eccentric upon vertical member.
- l) The number of nuts and bolts shall be adequate.
- m) All provisions of the design and / or drawings shall be complied with.
- n) Cantilever supports shall be adequate.
- o) Props shall be directly under one another in multistage constructions as far as possible.
- p) Guy ropes or stays shall be tensioned properly.
- q) There shall be adequate provision for the movement and operation of vibrators and other construction plant and equipment.
- r) Required camber shall be provided over long spans.
- s) Supports shall be adequate, and plumb within the specified tolerances.

1.6 FORM OIL:

Use of form oil shall not be permitted on the surface which require painting. If the contractor desire to use form oil on the inside of formwork of the other concrete structures, a non staining mineral oil or other approved oil may be used, provided it is applied before placing reinforcing steel and embedded parts. All excess oil on the form surfaces and any oil on metal or other parts to be embedded in the concrete shall be carefully removed. Before treatment with oil, forms shall be thoroughly cleared of dried splatter of concrete from placement of previous lift.

1.7 CHAMFERS AND FILLERS:

All corners and angles exposed in the finished structure shall be formed with mouldings to form chamfers or fillers on the finished concrete. The standard dimensions of chamfers and fillets, unless otherwise specified, shall be 20 x20 mm. Care shall be exercised to ensure accurate mouldings. The diagonal face of the

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moulding shall be planed or surfaced to the same texture as the forms to which it is attached.

1.8 VERTICAL CONSTRUCTION JOINT CHAMFERS:

Vertical construction joints on faces which will be exposed at the completion of the work shall be chamfered as above except where not permitted by Engineer-in-Charge for structural or hydraulic reasons.

1.9 WALL TIES:

Wire ties passing through the walls, shall not be allowed. Also through bolts shall not be permitted. For fixing of formwork, alternate arrangements such as coil, nuts shall be adopted at the contractors cost.

1.10 REUSE OF FORMS:

Before reuse, all forms shall be thoroughly scraped, cleaned, nails removed, holes that may leak suitably plugged and joints examined and when necessary repaired and the inside retreated to prevent adhesion, to the satisfaction of Engineer-in-charge. Warped lumber shall be resized. Contractor shall equip himself with enough shuttering to complete the job in the stipulated time.

1.11 REMOVAL OF FORMS:

Contractors shall record on the drawings or a special register, the date upon which the concrete is placed in each part of the work and the date on which the shuttering is removed there from.

In no circumstances shall forms be struck until the concrete reaches a strength of the at least twice the stresses due to self weight and any construction erection loading to which the concrete may be subjected at the time of striking formwork.

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	Part of structure	Earliest concrete age at stripping	
		Ordinary Portland cement concrete	Portland Pozzolana cement concrete
a)	Walls, columns and vertical sides of beams	24 to 48 hours as directed by the Engineer-in-Charge.	3 days
b)	Slabs (Props left under)	3 days	7 days
c)	Beam soffits (Props left under)	7 days	10 days
d)	Removal of props to slabs		
	i) Spanning up to 4.5 m	7 days	10 days
	ii) Spanning over 4.5 m	14 days	14 days
e)	Removal of props to beams and arches		
	i) Spanning up to 6 m	14 days	14 days
	ii) Spanning over 6 m	21 days	21 days
f)	For perforated slab 120 mm thick	14 days	14 days

In normal circumstances (generally where temperatures are above 20 Deg. C.) forms may be struck after expiry of the following periods:

Striking shall be done slowly with utmost care to avoid damage to arise and projection and without shock or vibration, by gently easing the wedges. If after

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removing the formwork, it is found that timber has been embedded in the concrete, it shall be removed and made good as specified earlier.

Reinforced temporary openings shall be provided, as directed by Engineer-in-Charge, to facilitate removal of formwork which otherwise may be in-accessible.

The rods, clamps, form bolts etc. which must be entirely removed from walls or similar structures shall be loosened not sooner than 24 hours nor later than 40 hours after concrete has been deposited. Ties, except those required to hold forms in place, may be removed at the same time. Ties withdrawn from walls and grade beams shall be pulled towards the inside face. Cutting ties back from the faces of walls and grade beams will not be permitted. Work damaged due to premature or careless removal of forms shall be re-constructed at contractors cost.

1.12 MODE OF MEASUREMENT:

In case the items of concreting are inclusive of cost of form work, no separate measurements shall be taken for form work. However, if the form work is to be paid separately and the item exists in the Schedule of Quantities for various types of form work the net area of exposed surface of concrete members as shown in drawings coming in contact with form work shall be measured under item of formwork in square meters.

All temporary formwork such as bulk heads, stop boards provided at construction joints which are not shown in the drawings shall not be measured.

No deductions shall be made for openings/obstructions upto an area of 0.1 sqm. and nothing extra shall be paid for forming such openings.

The rate shall included the cost of erecting centering shuttering materials, transport, deshuttering and removal of materials from site, charges for staging/scaffolding etc and labour required for all such operations etc.

* * * * *

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CHAPTER– VI

STEEL REINFORCEMENT

1.1 Steel reinforcement bars, if supplied or arranged by contractor shall high yield strength deformed bars as per I.S. 1786, as shown and specified on the drawings. Wire mesh or fabric shall be in accordance with I.S.1566. Substitution of reinforcement will not be permitted except upon written approval from Engineer-in-charge.

1.2 STORAGE

The reinforcement steel shall not be kept in direct contact with ground but stacked on top of an arrangement of timber sleepers or the like. Reinforcement steel shall be coated with cement wash before stacking to prevent scale and rust. Fabricated reinforcement shall be carefully stored to prevent damage, distortion, corrosion, and deteriorations.

1.3 MATERIAL

High strength deformed steel bars (HSD) of minimum grade Fe500D (TMT) conforming to IS: 1786 shall be used for all structures as specified in the drawing.

Over and above the provisions of IS: 1786, the following shall also be satisfied:

- (a) Total Elongation shall be more than 14.5%.
- (b) Ultimate Tensile Strength shall be 15% more than actual 0.2% proof stress/yield stress but not lesser than 545 N/mm².

Testing of reinforcement bars shall conform to provisions of IS: 1608. Approved binding wire shall be used for binding reinforcement bars.

The Contractor shall submit the manufacturer's test certificate for the material as per relevant IS. Random tests for each diameter of bar shall be performed at contractor's site laboratory. All costs, incidentals to such tests shall be borne by the Contractor and shall be deemed to have been included in his quoted rates. Steel not conforming to the specifications shall be rejected. All reinforcement shall be clean, free from grease, oil, paint, dirt, loose mill scales, loose rust, dust, bituminous material or any other substance that will destroy/ reduce bond. All bars shall be thoroughly cleaned before fabrication and placement. Pitted and defective bars shall not be used.

The steel shall be supplied from the manufacturer who produce the re-bars using billet produced from ore itself and not by re-melting of used steel. Reinforcement steel from re-rollers is not permitted to be used.

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All steel shall be Grade 1 quality . No rolled material will be accepted. If demanded by the Engineer-in-charge, Contractor shall submit the manufacturers test certificate for steel. Random tests on steel supplied by contractor may be performed by Department as per relevant Indian Standards. Steel not conforming to specifications shall be rejected. All reinforcement shall be clean, free from grease, oil, paint, dirt, loose mill, scale, loose rust, dust, bituminous material or any other substances that will destroy or reduce the bond. All rods shall be thoroughly cleaned before being fabricated. Pitted and defective rods shall not be used. All bars shall be rigidly held in position before concreting. No welding of rods to obtain continuity shall be allowed unless approved by the Engineer-in-charge. If welding is approved, the work shall be carried as per I.S. 2751, according to best modern practices and as directed by the Engineer-in-charge. In all cases of important connections, tests shall be made to prove that the joints are of the full strength of bars welded. Special specifications, as specified by the Engineer-in-charge shall be adhered to in the welding of cold worked reinforcing bars and bars other than mild steel. Before start of reinforcement work the brand shall be qualified and approved by Engineer in charge based on NABL approved testing laboratory results in the presence of NPCIL . All costs incidental to such tests shall be at contractors expense.

1.4 LAPS

Laps and splices for reinforcement shall be shown on the drawings. Splices in adjacent bars shall be staggered and the locations of all splices, except those specified on the drawings, shall be approved by the Engineer-in-charge. The bars shall not be lapped unless the length required exceeds the maximum available lengths of bars at site.

1.5 BENDING

All bars shall be accurately bent according to the sizes and shapes shown on the detailed working drawing/bar bending schedules. They shall be bent gradually by machine or other approved means. Reinforcing bars shall not be straightened and rebent in a manner that will injure the materials. Bars containing cracks or splits shall be rejected. They shall be bent cold, except bars of over 25mm in diameter which may be bent hot if specifically approved by the Engineer-in-charge. Bars which depend for their strength on cold working shall not be bent hot. Bars bent hot shall not be heated beyond cherry red colour (not exceeding 645 0C) and after bending shall be allowed to cool slowly with out quenching. Bars incorrectly bent shall be used only of the means used for straightening and rebending be such as shall not, in the opinion of the Engineer-in-charge injure the material. No reinforcement bar shall be bent when in position in the work without approval, whether or not it is partially embedded in hardened concrete. Bars having kinks or bends other than those required by design shall not be used.

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1.6 BENDING AT CONSTRUCTION JOINTS

Where reinforcement bars are bent aside at construction joints and afterwards bent back into their original position, care should be taken to ensure that at no time the radius of the bend is less than 4 bar diameters for plain mild steel or 6 bar diameters for deformed bars. Care shall also be taken when bending back bars to ensure that the concrete around the bar is not damaged.

1.7 FIXING/PLACING AND TOLERANCE ON PLACING

Reinforcement shall be accurately fixed by any approved means maintained in the correct position as shown in the drawings by the use of blocks, spacers and chairs as per I.S. 2502 to prevent displacement during placing and compaction of concrete. Bars intended to be in contact at crossing point shall be securely bound together at all such points with number 16 gauge annealed soft iron wire. The vertical distances required between successive layers of bars in beams or similar members shall be maintained by the provision of mild steel spacer bars at such intervals that the main bars do not perceptibly sag between adjacent spacer bars.

1.8 TOLERANCE ON PLACING OF REINFORCEMENT

Unless otherwise specified by the Engineer-in-charge reinforcement shall be placed within the following tolerances.

Tolerance in spacing

- | | | |
|----|---------------------------------------|-------------|
| a) | For effective depth, 200mm or less | ± 10 mm |
| b) | For effective depth, more than 200 mm | ± 15 mm |

1.9 COVER TO REINFORCEMENT

The cover shall in no case be reduced by more than one third of specified cover or 5 mm whichever is less.

Unless indicated otherwise on the drawings clear concrete cover for reinforcement (exclusive of plaster or other decorative finish shall be as follows:

- At each end of reinforcing bar not less than 25 mm, nor less than twice the diameter of such, bar.
- For a longitudinal reinforcing bar not less than 25 mm, nor more than 40 mm., nor less than the diameter of such bar. In the case of column of maximum dimensions of 200 mm or under whose reinforcing bars do not exceed 12 mm, a cover of 25 mm may be used.
- For longitudinal reinforcing bar in a beam not less than 25mm nor less than diameter of such bar.

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- d) For tensile, compressive, shear, or other reinforcement in a slab, not less than 25 mm, nor less than the diameter of such bar and
- e) For any other reinforcement not less than 15mm, nor less than the diameter of such bar.
- f) Increased cover thickness may be provided when surfaces of concrete members are exposed to the action of harmful chemicals (as in the case of concrete in contact with earth faces contaminated with such chemicals) acid, vapour, saline atmosphere, sulphurous smoke (as in the case of steam-operated railways) etc. and such increase of cover may be between 15mm and 50mm beyond the figures given in (a to c) above as may be specified by the Engineer-in-charge.
- g) For reinforced concrete members, totally immersed in sea water, the cover shall be 40mm, more than specified (a to c)above.
- h) For reinforced concrete members, periodically immersed in sea water or subject to sea spray, the cover of concrete shall be 50 mm more than that specified(a to e)
- i) For concrete of grade M 25 and above, the additional thickness of cover specified in (f) (g) and (h) above may be reduced to half. In all such cases the cover should not exceed 75 mm.
- j) Protection to reinforcement in case of concrete exposed to harmful surroundings may also be given by providing a dense impermeable concrete with approved protective coating, as specified on the drawings. In such case the extra cover, mentioned in (h) and (i) above, may be reduced by the Engineer-in-charge, to those shown on the drawing.
- k) The correct cover shall be maintained by cement mortar briquettes or other approved means. Reinforcement for footings, grade beams and slabs on sub grade shall be supported on precast concrete cover blocks as approved by the Engineer-in-charge. The use of pebbles or stones shall not be permitted.
- l) The minimum clear distance between reinforcing bars shall be in accordance with I.S. 456 or as shown in drawing.

1.10 INSPECTION

Erected and secured reinforcement shall be inspected and approved by Engineer-in-charge prior to placement of concrete.

1.11 MODE OF MEASUREMENT FOR REINFORCEMENT FOR R.C.C

WORKS:

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Reinforcement as detailed in schedule of quantities shall be measured for payment lineally as per the cutting length nearest to a centimeter shown in bar bending schedule submitted by the contractor and approved by the Engineer-in-charge and weight calculated based on the standard weights as per I.S. per meter length. No allowance shall be made/be measured in the weight for rolling margin. Only authorised laps shall be measured. The cost of steel used by the contractor in the reinforcement of beams. Slabs and columns etc will be paid as per the rate of reinforcement only up to the extent shown in the drawings. As far as possible laps in bars shall be avoided. Any laps and hooks provided by the contractor other than authorized as per approved bar bending schedule will be considered to have been provided by the contractor for his own convenience and shall not be measured for payment. Pins, chairs, spacers shall be provided by the contractor wherever required as per drawing and bar bending schedule and as directed by the Engineer-in-charge and shall be measured for payment. Fan hooks as required shall be provided by the contractor under this item and shall be measured for payment.

The rate shall include the cost of all materials and labour required for all above operations including transport, wastage straightening, cutting, bending, binding and the binding wire, cover block required and required scaffolding arrangements for placing in position.

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CHAPTER- VII

STRUCTURAL STEEL

1.1 SCOPE OF WORK:

The work covered by this specification consists of supply, fabrication and erecting of structural steel members in strict accordance with this specification and the approved drawings:

1.2 MATERIALS:

All structural steel shall be of standard sections as marked on the drawings and shall be free of scale, blisters, lamination, cracked edges and defects of any sort. The contractor is required to bring such steel, the contractor shall furnish duplicate copies of all purchase orders and/or also the test report received from the manufacturers, to satisfy the Engineer-in-charge.

All structural steel and electrodes shall confirm to relevant I.S..

1.3 WORKMANSHIP:

All workmanship shall be of first class quality in every respect to the greatest accuracy being observed to ensure that all parts will fit together properly on erection.

All ends shall be cut true to planes. They must fit the abutting surfaces closely. All stiffeners shall be fit tightly at both ends.

All but ends of compression members shall be in close contact through the area of the joints.

All holes in the plate and section between 12 mm and 20 mm thick shall be punched to such diameter that 3 mm of metal is left all around the hole to be cleaned out to correct size by reamer.

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The base connection shall be provided as shown on drawings and the greatest accuracy of workmanship shall be ensured to provide the best connections.

Figured dimensions on the drawings shall be taken.

1.4 ERECTION AND MARKING:

Erection and fabrication shall be according to I.S. 800 of latest version section - 11. During erection, the work shall be securely braced and fastened temporarily to provide safety for all erection stresses etc., No permanent welding shall be done until proper alignment has been obtained.

Any part which do not fit accurately or which are not in accordance with the drawings and specifications shall be liable to rejection and if rejected, shall be at once be made good.

Engineer-in-charge shall have full liberty at all reasonable times to enter the contractors premises for the purpose of inspecting the work and no work shall be taken down, painted or despatched until it has been inspected and passed. The contractor shall supply free of charge all labour and tools required for testing of work.

1.5 DELIVERY AT SITE

The contractor shall deliver the component parts of the steel work in an undamaged state at the site of the works and the Engineer-in-charge shall be entitled to refuse acceptance of any portion which has been bent or other wise damaged before actual delivery on work.

1.6 SHOP DRAWINGS:

The shop drawings of structural steel based on contract drawings shall be submitted to the engineer-in-charge. The necessary information for fabrication, erection, painting of structure etc., must be furnished immediately after acceptance of the tender.

1.7 PAINTING:

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All structural steel parts shall be painted with two coats of synthetic enamel paint over a coat of primer. Painting should be strictly according to relevant Indian Standard.

1.8 WELDING:

Welding shall be in accordance with I.S. 816 of latest version IS.819 of latest version, I.S.1024 of latest version, I.S.1261 of latest version, I.S. 1323 of latest version and I.S. 9595 of latest version as appropriate. For welding of any particular type of joint, welders shall give evidence of having satisfactory completed appropriate tests as described in any of I.S. 817 of latest version, I.S 1393 of latest version, I.S. 7307(Part –I of latest version, I.S. 7310 (part-I) of latest version and I.S. 7318 (part-I) of latest version as relevant.

1.8.1 WELDING CONSUMABLES:

Covered electrodes shall conform to I.S. 814(part-I) of latest version and I.S.814 (part-II) of latest version or I.S.1395 of latest version as appropriate. Filler rods and wires for gas welding shall conform to I.S. 1278 of latest version. The bare wire electrodes for submerged arc welding shall conform to I.S. 7280 of latest version. The combination of arc and flash shall satisfy the requirements of I.S. 3613- of latest version. The filler rods and bare electrodes for gas shielded metal, arc welding shall conform to I.S.6419 of latest version and I.S. 6560 of latest version as appropriate.

1.8.2 TYPES OF WELDING:

Arc welding (direct or alternating current) or Oxyacetylene welding may be used. Field welding may be used .Field welding shall be by D.C.

1.8.3 SIZE OF ELECTRODE RUN:

The maximum gauge of the electrodes for welding any work and the size of run shall be based on the following tables.

Average thickness of plate or section	Maximum gauge or diameter of electrodes to be used.
Less than 3/16"	10 S.W.G
3/16" and above but less than 5/16"	8 S.W.G.
5/16" and above but less than 3/8"	6 S.W.G

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3/18" and above but less than 5/8 "	4 S.W.G
5/8" and above but less than 1"	5/16"dia.
1" and above thick section	3/8"dia.

Note: On any straight weld the first run shall not ordinarily be deposited with larger gauge electrodes than No 8 S.W.G. For subsequent runs the electrode shall not be increased by more than two electrode size between consecutive runs.

1.8.4 WELDING CONTRACTORS:

The contractor shall ensure that each welding operator employed on fabrication or erection is an efficient and dependable welder, who has passed qualifying tests on the types or welds which will be called upon to make. Sample test shall have to be given by the contractor to the entire satisfaction of the Engineer-in-Charge.

1.8.5 WELDING PROCEDURE:

Welding should be done with the structural steel in flat position in a down hand manner wherever possible. Adequate steps shall be taken to maintain the correct arc length, rate of travel, current and polarity for the type of electrode and nature of work. Welding plant capacity shall be adequate to carry out the welding procedure laid down. Adequate means of measuring the current shall be available either as a part of the welding plant or by provision of a portable ammeter. In checking the welding current, a tolerance of 10% or 30 amperes from the specified value whichever is less shall be permitted.

The welding procedure shall be such as to ensure that the weld metal can be fully and satisfactory deposited through the length and thickness of all joints so that

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distortion and shrinkage stresses are reduced to the minimum and thickness of welds meet the requirements of quality specified.

1.9 WORKMANSHIP:

1.9.1 Preparation of Fusion Faces: Fusion faces shall be cut by steaming machine or gas cutting and later dressed by filing or grinding so that they shall be free from irregularities such as would interfere with the deposition of the specified size of weld to cause the defects. Fusion faces and the surrounding surfaces shall be free from heavy slag, oil paint or any substance which might affect the quality of the weld or impede the progress of welding. The welding face shall be free of rust and shall have metal shine surfaces.

The parts to be welded shall be brought into as close contact as possible and the gap due to faulty workmanship or incorrect fit up shall not exceed 1/16". If separation of 1/16" or more occurs locally, the size of the fillet weld shall be increased at such position by an amount equal to the width of the gap.

The parts to be welded shall be maintained to their correct position during welding. They shall be securely held in position by means of tack welds, service bolts, clamps or rings before commencing welding so as to prevent and relative movement due to distortion, wind or any other cause.

1.9.2 Step beak Method should be used to avoid distortion:

The minimum leg length of a fillet weld as deposited should not be less than the specified size and the throat thickness as deposited should be not less than that tabulated below:

Throat Thickness of Fillet:

Angle between fusion faces	60-90	91-100	101-106	107-113	114-120
Throat Thickness in cms	0.70	0.65	0.60	0.55	0.50

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In no case should a concave weld be deposited without the specific approval of the Engineer-in-charge unless the leg length is increased above the specified length so that the resultant throat thickness is as great as would have been obtained by the deposition of a flat.

All welds shall be deposited in a pre-arranged order and sequence taking due account of the effects of distortion and shrinkage stresses.

After making each run of welding, all slag shall be removed and final run shall be protected by clean boiled linseed oil till approved.

The weld metal, as deposited shall be free from crack, slag, excessive porosity, cavities and other faults.

The weld metal shall be properly fused with the parent metal without overlapping or serious undercutting at the toes of the weld.

The surfaces of the weld shall have a uniform and consistent contour and regular appearance.

In welds containing crack, porosity or cavities in which the weld metal tends to overlap on the parent metal without proper fusion, the defective portions of the welds shall be out cut and rewelded. Where serious under cutting occurs additional weld metal shall be deposited to make good reduction.

1.10 MODE OF MEASUREMENT:

All structural steel be measured on weight basis in metric tones as mentioned in the schedule of quantities. The length or areas of various members including gusset plates shall be measured correct to two places of decimals and the net weight worked out from the standard steel tables approved by Indian Standard Institution. No separate measurements shall be taken for welding, riveting, bolting, filed connections etc., The rate shall include cost of all Labour, materials, scaffolding, transport and also cost of welding, riveting and bolting, field connections if any all to complete the job as per specifications including application of two or more coats of

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synthetic enamel paint to give an finished surface over a coat of zinc chromites primer over all the surfaces of the structural steel placed.

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Chapter – VIII

CEMENT BONDED PARTICLE BOARDS

1.1 SCOPE OF WORK:

The work covered by this specification includes providing and fixing the Cement bonded particle boards as partitions in the Cupboards, wardrobes etc., strictly in accordance with these specifications and drawings.

1.2 MATERIAL:

The Cement bonded particle board conforms to IS-14276 of latest version, shall be of approved manufactures as directed by the Engineer in charge and it shall be free from scratches, bends, or other defects. The Cement bonded particle board in bulk quantities shall be brought to site in Makers original packings and Makers guarantee shall be produced if called for by the Engineer-in-charge and also it should match the physical characteristics as per IS-14276 of latest version. The Cement bonded particle board shall be of required thickness as mentioned in the items of schedule of quantities and/or drawing or as directed by the Engineer-in-charge. The contractor shall submit the sample of the Cement bonded particle board which he proposes to use on the work and only such approved quality of Cement bonded particle board shall be used in the works. Each board shall be legibly marked or stabled near any of its edges with the name of the manufacturer or trade mark if any, thickness and date of manufacture etc. The Cement bonded particle board brought to site shall be protected against damages.

1.3 FIXING:

The Cement bonded particle boards shall be fixed to the frame as mentioned above in the Cupboard/Wardrobes, on the brick wall/concrete area by chipping the area for proper recess to fix the board in position etc and also filling the recessed area with required fixing materials such as cement mortar etc complete and making the surface good also finishing the edges smooth. Any damages or

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breakage in the boards shall be made good at the contractors own cost till the work is properly taken over by the Engineer-in-charge.

1.4 GENERAL:

After the Inspection is over and permitted by the Engineer-in-charge, the Cement bonded particle boards shall be deemed off any labels, paint smears and spots shall be washed from both the side and all boards left clear, perfect and free from ratting. The Contractor shall provided all the scaffolding, tools and plants for fixing the Cement bonded particle boards at his own cost.

1.5 RATES:

The rate quoted shall include cost of all materials including all taxes, duties etc. tools, plants, labour involved in all the operations described above, fixing in final position etc. and all incidentals to the job involved.

1.6 MODE OF MEASUREMENT:

This item shall measured in sqm. Correct to two places of decimal. Length and breadth shall be measured correct to 1 cm.

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CHAPTER – IX

CEMENT CONCRETE BLOCK MASONRY

1.1 SCOPE

This specification covers construction of walls of buildings using normal cement concrete blocks conforming to IS-2185 of latest version. PPC/Fly ash should not be used during manufacturing of Cement Concrete Blocks. Prior permission to be obtained for Plant qualification including ingredients utilization. Based on request, NPCIL will qualify two to three sources for progress of the work.

1.2 DIMENSION, TOLERANCES, SHAPE, WEIGHT, SURFACE FINISHING

The concrete block shall be machine made pre-cast blocks of the required strength, density and water absorption as described below. The blocks shall have nominal dimensions of 400 mm x 200 mm x 200 mm & 400 mm x 200 mm x 100 mm or any other suitable size as approved by the engineer to suit the requirement. The variation in length of the units shall not be more than ± 5 mm and variation in height and width of units, not more than ± 3 mm. The blocks shall be of rectangular shape and shall be solid concrete blocks of grade as per IS 2185. The water absorption for the concrete block shall not be more than 10% by mass. The block density of the grade of blocks shall not be less than 1800 kg/cum. The surface of the blocks shall be compatible for applying plastering.

1.3 CURING

The blocks shall be cured as per 13.5 of IS-456 so as to deliver the specified strength of block.

1.4 SAMPLING, TESTING AND STRENGTH

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Prior to manufacture, trial mixes shall be prepared. When suitable mixes have been established, a sufficient number of blocks shall be cast to permit the Engineer to check the density strength and water absorption and surface finish. If accepted, these shall be the standard for all blocks to be manufactured. Standard Methods of sampling and Testing Units of I.S. 1199 shall apply in addition to the requirement of this specification. The average compressive strength of the cured concrete blocks shall not be less than 50 kg/cm² at 28 days after casting.

1.5 MATERIALS

The materials shall conform to Clause :6 of IS – 2185 of latest version. However PPC/Fly ash should not be used during manufacturing of Cement Concrete Blocks.

1.6 LAYING AND WORKMANSHIP

Concrete Block masonry in superstructure shall be laid in mortar of proportions as indicated in ‘Schedule of Quantities & Rates’. The mortar shall be spread over the entire top surface of the block including the front and rear shells, as well as the webs to a uniform layer of minimum 10mm thickness. Full mortar bedding shall be obtained for complete utilization of load carrying capacity of the blocks. For the vertical joints the mortar shall be applied on the vertical edges to secure proper lateral support.

The first course of concrete masonry shall be laid with great care to ensure proper alignment, level and plumb. To facilitate this alignment of the wall shall be marked on the existing foundation/slab. The construction of the wall shall be started from one end proceeding in the other direction. Each course shall be checked for alignment and plumb. All mortar joints shall be 10 mm thick.

The mortar joint shall be raked out in order to have a key for plaster.

Door and window hold-fasts should be at block course level and their ends are to be embedded in a hollow, which shall be filled up with concrete of grade M-15 without any extra cost. The filling concrete should be properly done with adequate tamping so

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as to obtain a finished surface nearly as good as the pre-cast block used for the masonry work.

1.7 MODE OF MEASUREMENT:

a) For Cement Concrete block masonry walls measured in cubic meters:

The contractor rate shall be for a unit of one cubic meter of masonry as actually done 200 mm. thick (or as specified in schedule) walls shall be taken as one block thick.

All openings in block work for doors, windows and ventilators shall be deducted to get the net quantity of actual block work done.

Openings or chases required for P.H or electrical inserts less than 0.1 sq.m and bearing of precast concrete members shall not be deducted. No extra payment shall be made for any extra work involved in making the above openings or placements.

b) For Cement Concrete blocks measured in square meter:

Cement Concrete block masonry walls shall be measured in sq.m for a thickness of 100mm. All openings in block work for doors and windows and ventilators shall be deducted to get the net quantity of actual work done. Opening or chases required for P.H. or Electric inserts less than 0.1 sq.m and bearing of precast concrete members shall not be deducted. No extra payments shall be made for extra work involved in making the above openings or placements. Also the rate quoted is including providing 40mm thick Cement Concrete 1:2:4 at every third layer.

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CHAPTER – X

CEMENT PLASTERING FOR WALLS AND CEILINGS PLASTERS

1.1 SCOPE OF WORK:

The work covered under these specifications consists of supplying all materials and rendering all types of plaster / pointing finishes strictly in accordance with these specifications, applicable drawings etc.

1.2 GENERAL

Cement sand and water required for the work shall conform to specifications laid down herein before under section cement concrete (plain and reinforced). The plastering works shall generally conform I.S. 1661 of latest version (Pt. III) (Code of practice for cement and cement lime plaster finish on walls and ceilings). All general precautions as specified in I.S. 1661 of latest version (Pt. III) clause-8, shall be taken and preparation of the back ground shall be done as laid down in I.S. 1661 clause 12 and I.S. 2402 of latest version shall be generally followed for rough cast and sand faced plaster work. Scaffolding at all elevations required for facility of working shall be provided by the contractor at his own cost including cost of Man lifter etc. This may be double scaffolding according to the requirement and shall be approved by the Engineer – in – charge. Stage scaffolding shall be erected when ceiling plastering is done. The contractor shall be responsible for accidents, if any, take place. The contractor shall co-operate with the other agencies also. Whenever electrical contractor/agency has to fix up switch boxes in walls, necessary Thiyyas, tapanish or Dhadas shall be arranged to be given in advance of actual plastering process at these locations so that the boxes are fixed properly in line with finished plaster surface. All finishing in and around these boxes as also around the conduit boxes in ceiling shall be done by plastering contractor without any extra cost to the Department. The decision of the Engineer-in-charge in this regard shall be final and binding on the contractor.

1.3 PREPARATION OF SURFACE:

The surface to be plastered shall first be thoroughly cleaned of all muck and cleaned down. All joints shall be raked out in case of brick work/stone masonry and closely hacked in case of concrete as the work proceeds. The surface to be plastered shall be well wetted for a minimum period of 6 hours before

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commencing the work. The mortar for all plaster work shall be cement mortar of mix as specified in the schedule of quantities.

After erection of scaffolding and before commencement of plastering work, top most junctions/joints/sides with beam/ column shall be thoroughly packed with cement mortar to prevent cracks.

Before commencement of plastering operation the contractor shall ensure that all the service pipes, electrical conduits, boxes, switch boxes etc. have been installed in position by other agencies and the plastering surface is duly approved by the Engineer-in-charge. In order to enable other service contractors to fix the electrical conduits, conduit boxes, EDBs, pipes, outlets etc. in proper level and line with reference to the finished surface of the plaster. Thiyyas and Tapanis i.e. finished plaster patches shall be given by the main civil contractor on walls, ceiling at regular intervals well in advance of his plaster work at no extra cost to the department. The entire work of preparation of surface before plastering shall thus be co-ordinated by the main civil contractor with all other agencies working at site.

Just before actual plastering work is taken up in hand all the ceiling and walls etc, shall be marked with Tapanis or Thiyyas indicating the thickness of plaster required and which shall be in true line, level and plumb. The contractor shall get these marks approved by the Engineer-in-Charge before starting the plastering work. The contractor shall also be responsible to render the final surface true to line, level and plumb etc.

All building operations like construction of walls, concreting etc. shall have been completed before plastering is taken up. The plastering operation should be taken up only after the service pipes etc. that are to be embedded in the wall or ceiling are completed and suitably protected against corrosion by other agencies and okayed by the Engineer-in-charge. Damage if caused to any of the existing fittings, fixtures including doors and windows etc. during the plastering operation shall be made good by the contractor at his own cost.

The joint area between column & brickwork and beams are to be fixed with Chicken Mesh by nailing cement mortar etc. This area of application of Chicken Mesh will be paid under relevant item of SOQR.

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If the surface which is to be plastered either internally or externally is out of plumb and not in line and level and if the plastering to be done is more than specified thickness to bring the plastered surface to perfect line and levels, in such specific cases. Chicken wire mesh is to be provided by the contractor at his own cost and the plaster should be done to required line and level with no extra cost whatsoever.

The finished plastered surfaces shall be free from cracks, fissures, crevices, hair cracks, blisterings, local swellings and flakings. The finished surface shall be true to line, level, plumb & plain and durable. The adhesion of the mortar with the background surface is of prime importance as this affects durability of plaster preparation of surface which has to take plastering is of great importance. Before starting the plastering work the surface should be got approved by the Engineer-in-Charge.

In order to avoid the formation of deep and side cracks and for dispersion of cracks at the junctions between concrete surface and brick masonry work as also between junction of windows/door frames and brick masonry works, cautionary measures such as fastening and lapping of chicken mesh over the junction areas should be carried out over which the plastering work has to be taken up as required by the Engineer-in-charge.

The minute gap between window/door frames with cills and jambs should be filled by silicon sealants, Rubber based sealants of approved brand by caulking guns or by approved methods as instructed/approved by Engineer-in-Charge.

1.4 GROOVES:

The grooves shall be of required dimensions. The same shall be made to turn wherever necessary. The finish shall be of the same finish as that of the plaster. The lines of the grooves shall be well defined and rounded. The grooves are to be provided in plastering in internal and external surfaces without any extra charges.

1.5 MIX PROPORTIONS:

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The mortar for plastering shall be of proportion as specified in the item schedule.
The mixes specified in the schedule are volumetric.

1.6 MIXING

Cement and fine aggregates shall be mixed dry in the required proportions to obtain a uniform colour. Water shall then be added to get the required consistency for the plaster.

Mixing shall be done mechanically. However, manual mixing will be allowed only in exceptional circumstances at the discretion of the Engineer-in-Charge. Manual mixing, where adopted, shall be carried out on a clean water tight platform. After water is added during mixing, the mix shall be held back and forth for 10 to 15 minutes.

In machine mixing, the mixer shall run atleast five minutes after placing all the ingredients in the drum. Only so much quantity of mortar which can be used within half an hour after the addition of water shall be prepared at a time. Any mortar for plaster which is set or partially set shall be rejected and shall be removed forthwith from the site.

6MM PLASTER:

The plaster shall be laid with somewhat more than 6 mm, thickness and pressed and leveled with wooden ruler to a finished minimum thickness of 6 mm. Straight edges shall be freely used to ensure a perfectly even surface. All exposed angles and junctions of walls, beams, slabs etc. shall be carefully finished so as to furnish a neat and even surface.

12MM PLASTER:

The plaster shall be laid with somewhat more than 12 mm, thickness and pressed and levelled with wooden ruler to a finished minimum thickness of 12 mm. Straight edges shall be freely used to ensure a perfectly even surface. All exposed angles and junctions of walls, doors, windows, beams, slabs etc. shall be carefully finished so as to furnish a neat and even surface.

20MM PLASTER:

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The proportions of sand and cement shall be as specified and shall cover all irregularities, undulations, depressions due to chasing etc. in the surface to be plastered. The mortar shall be applied slightly more than 20mm. thick and pressed and levelled with wooden ruler or straight edge to finished minimum thickness of 20mm. Plastering has to be done in two coats comprising of 12mm base coat and after setting of base coat, 8mm thick final coat to be done. 20mm thick in single coat is not permitted. Straight edges shall be freely used to ensure a perfectly even surface. The finished surface shall be true and even and present uniform texture throughout and all joining marks shall be eliminated. All corners, edges and angles shall be made perfectly to line, plane and plumb.

All exposed angles and junctions of walls, doors, windows, beams, slabs etc. shall be carefully finished so as to furnish a neat and even surface.

As the type of building is Multistoried of 11 storey (35m height from Ground level) the external plastering has to be carried out only by Man lifter of adequate height on contractors scope.

Plastering items amongst all other things as described in various items also include:

- i) Preparation of surfaces to receive the plaster, providing cement plaster of the specified average thickness and proportions with specified number of coats.
- ii) All labour, materials, scaffolding, man lifter, use of tools and equipment to complete the plastering work as per specifications.
- iii) Curing for 10 days.
- iv) Cleaning the surface of doors, windows, floors or any other surface where plastering might have splashed.
- v) Finishing the portion of plaster left above the flooring top/skirting work to be finished rounded or as directed by the Engineer-in-Charge, in a separate operation after laying of floors tiles, skirting.

1.7 MODE OF MEASUREMENT:

1.7.1 Area of plastering will be measured net and shall be paid for. The measurement of length of wall plastering shall be taken between walls or partitions (dimensions before plastering shall be taken) for the length and from top of the floor or skirting or dado as the case may be to the underside of ceiling for the height. All openings

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more than 0.1 sqm. shall be deducted and all jambs, soffits, sills of these openings if done, will be measured to arrive to the net area for payment. No opening less than 0.1 sqm. shall be deducted and no jambs etc. for such openings shall be measured for payment. The rate shall include the cost of finishing all the edges, corners, cost of all materials, labours, scaffolding, transport, curing etc.

1.7.2 The rate shall include the cost of finishing all the edges, corners, cost of all materials, labour, transport, scaffolding, curing etc. and grooved if so specified in the item of schedule of quantities.

The rate for plastering should include the cost of work towards the following items for co-ordination with electrical item.

1. Neatly plastering around DBs, junction boxes, M.S. boxes etc. should be done and made matching with the wall finish after installation of electrical equipments.
2. All DBs, service boxes, covers etc. should be covered by a plastic cloth or other suitable covering materials such that water or materials should not splash the same during brick work and plastering work. This is to be done in such a way that electrical equipments as well as painted surfaces are not spoiled.
3. For fixing M.S. boxes, DBs etc. Thiyya should be given such that the required face of the M.S. box, DB covers etc inline with final finished plastered surface.
4. The rate for the item shall also include rounding up of corner and angles making sharp corners and angles finishing around ceiling rose and electrical fittings etc. fixed by other agencies, finishing of top of dado and skirting (zad finishing), junctions of roof and wall or beam with the finish as specified in the item. Plastering of brick and concrete cornice and copings and plastering in restricted areas if any shall not be measured separately. Architectural bands, grooves,borders and narrow widths of plaster over structural as well as non-structural and the line when prepared in the same thickness of plaster shall not be measured separately and shall be covered by respective plaster items.

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CHAPTER – XI

FLOORING & DADOING WORKS

MATERIALS FOR SKIRTING/DADOING:

White Glazed Tiles: The tiles shall be of approved make and shall generally conform to IS: 15622 of latest version. They shall be flat and true to shape, free from cracks, crazing spots, chipped edges and corners. The glazing shall be of uniform shade.

The size of the tiles shall be as per the item description. The length of all four sides shall be measured correct to 0.1 mm and average length breadth shall not vary more than +0.8 mm from specified dimensions. The variation of individual dimensions from average value of length/breadth shall not exceed ± 0.5 mm. Tolerance in thickness shall be (+/-) 0.4 mm.

The thickness of the tiles shall not be less than 6 mm or as specified in the items and shall conform to I.S. 15622 of latest version in all respects. Samples of tiles shall be got approved by the Engineer-in-charge before use on the work.

MATERIALS FOR FLOORING:

Unglazed Ceramic Tiles: The tiles shall be of approved make and shall generally conform to IS: 15622 of latest version. They shall be flat and true to shape, free from cracks, crazing spots, chipped edges and corners. The glazing shall be of uniform shade.

The size of the tiles shall be as per the item description. The length of all four sides shall be measured correct to 0.1 mm and average length breadth shall not vary more than +0.8 mm from specified dimensions. The variation of individual dimensions from average value of length/breadth shall not exceed ± 0.5 mm. Tolerance in thickness shall be (+/-) 0.4 mm.

The thickness of the tiles shall not be less than 6 mm or as specified in the items and shall conform to I.S. 15622 of latest version in all respects. Samples of tiles shall be got approved by the Engineer-in-charge before use on the work.

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PREPARATION OF SURFACE & LAYING:-

Sub grade concrete or RCC slab or side brick wall/ or plastered surfaces on which tiles are to be laid shall be cleaned, wetted and mopped as specified. 20 mm, thick Base layer of C.M 1:3 shall be applied and allowed to harden. The plaster shall be roughened with wire brushes or by scratching diagonal lines 1.5mm, deep at 7.5mm. centre about both ways. The entire back surfaces of tiles shall be buttered with a coat of grey cement slurry paste set in the bedding mortar. The tiles shall be tapped and corrected to proper planes and lines. The tile shall be butt jointed in pattern and joints shall be as fine as possible. The top of skirting/dado shall be truly horizontal and joints truly vertical.

After a period of curing of 7 days minimum, the tiles shall be cleaned and shall not sound hollow when tapped.

The surface during laying shall be checked with a straight edge 2M long.

Tiles shall enter not less than 10mm. under side skirting.

After the tiles have been laid, surplus cement grout shall be cleaned off.

MORTAR AND BEDDING:-

Cement mortar for bedding shall be of proportion specified in items schedule and shall conform to the specification for materials, preparations etc, as specified under cement mortar. The amount of water added while preparing mortar shall be the minimum necessary to give sufficient plasticity for laying. Care shall be taken in preparation of the mortar to ensure that there are no hard lumps that would interfere with even bedding of the tiles. Before spreading the mortar bed the base shall be cleaned of all dirt, scum or laitance and loose materials and well wetted without forming any pools of water on the surface. The mortar of specified proportion and thickness shall then be even and smoothly spread over the base by use of screed battens to proper level or slope.

Cement mortar of thickness and proportion as specified in the schedule for dado shall be applied to the wall after preparing the wall surface as specified under cement plaster 20mm.thick and brought to correct line and plumb and the surface left rough to receive the tiles.

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FIXING OF TILES FOR FLOORING:-

The tiles before laying shall be soaked in water for atleast 2 hours. The tiles shall be laid on the bedding mortar in CM 1:4 of minimum 20mm thickness and when it is still plastic but has become sufficiently stiff to offer a fairly firm cushion for the tiles. Tiles which are fixed on the flooring adjoining the wall shall be so arranged that the surface on the round edge tiles shall correspond to the skirting or dado. Neat cement mortar grout 1:2 using fine sand (table III, zone-IV and as per I.S.383) of honey like consistency shall be spread over the bedding mortar just to cover as much area as can be tiled within half an hour. The edges of the tiles shall be smeared with neat white cement slurry and fixed in this grout one after the other, each tile being well pressed and gently tapped with a wooden mallet till it is properly bedded and in level with the adjoining tiles. There shall be no hollows in bed or joints. The joints, shall be kept as close as possible and in straight line. The joints between tiled shall not exceed 3.00 mm. in width. The joint shall be grouted with tile mate epoxy based tile joint filler with coloring pigments to match the tiles. After fixing the tiles, finally in an even plane or slope, the flooring shall be covered with wet sand and allowed undisturbed for 14 days.

FIXING TILES FOR DADO& SKIRTING/FACIA:

The dado work, shall be done only after fixing the tiles/slabs on the floor. The wall tiles to be fixed using approved brand Tile fixing adhesives as per manufacturers recommendations. The fixing shall be done from bottom of wall upwards without any hollows in the bed of joints. Each tile shall be as close as possible to one adjoining. The joints between the tile shall not exceed 1.00 mm. in width and they shall be uniform. The joint shall be grouted with approved make white cement/adhesives with colouring pigments to match the colour of tile

While fixing tiles in dado work, care shall be taken to break the joints vertically. The top of the dado shall be touched up neatly with the rest of the adhesive above.

If doors, windows or other openings are located within the dado area, the corners, sills, jambs etc. shall be provided with true right angles without any specials. The contractor will not be entitled to any extra claims on this account for cutting of tiles if

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required. For corner areas in dados, PVC beading of matching approved colour to be fixed without any extra costs. (Tiling wall area shall not be measured in plastering payment and it includes in the items of Wall dadoing only).

CLEANING:

After the tiles have been laid in a room or the days fixing work is completed, the surplus cement grout that may have come out of the joints shall cleaned off before it sets. After the complete curing, the dado or skirting over shall be washed thoroughly clean. In the case of flooring, once the floor has set, the floor shall be carefully washed clean and dried. When dry, the floor shall be covered with oil free dry saw dust. It shall be removed only after completion of the construction work and just before the floor is used.

POINTING AND FINISHING:

The joints shall be cleaned off with wire brush to a depth of 3 mm. and all dust and loose mortar removed. Joints shall then be flush pointed with white cement and floor kept wet for 7 days and then cleaned. Finished floor shall not sound hollow when tapped with a wooden mallet.

MODE OF MEASUREMENT:

Dado/flooring/skirting shall be measured in sqm. Correct to two places of decimal. Length and breadth shall be measured correct to 1 cm. between the exposed surfaces of skirting or dado. No deductions shall be made for extra paid for any opening of area upto 0.1 sqm.

The rate shall include all the cost of labour and materials including base cement mortar plaster involved.

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VITRIFIED TILE FLOORING, DADO / SKIRTING

MATERIALS FOR FLOORING SKIRTING/DADOING:

Vitrified Tiles: The tiles shall be of approved make and shall generally conform to IS-15622. They shall be flat and true to shape, free from cracks, crazing spots, chipped edges and corners.

The tiles shall be of size not less than 600x600 mm, thickness not less than 8mm of Premium Quality vitrified (Straight edge) porcelain vitrified tiles. The length of all four sides shall be measured correct to 0.1 mm and average length breadth shall not vary more than +0.8 mm from specified dimensions. The variation of individual dimensions from average value of length/breadth shall not exceed ± 0.5 mm. Tolerance in thickness shall be (+/-) 0.4 mm. Samples of tiles shall be got approved by the Engineer-in-charge before use on the work.

PREPARATION OF SURFACE & LAYING:-

Sub grade concrete or RCC slab or side brick wall/ or plastered surfaces on which tiles are to be laid shall be cleaned, wetted and mopped as specified. 20 mm, thick Base layer of C.M 1.4 shall be applied and allowed to harden. The plaster shall be roughened with wire brushes or by scratching diagonal lines 1.5mm, deep at 7.5mm. centre about both ways. The entire back surfaces of tiles shall be buttered with a coat of grey cement slurry paste and set in the bedding mortar. The tiles shall be tapped and corrected to proper planes and lines. The tile shall be butt jointed in pattern and joints shall be as fine as possible. The top of skirting/dado shall be truly horizontal and joints truly vertical.

After a period of curing of 7 days minimum, the tiles shall be cleaned and shall not sound hollow when tapped.

The surface during laying shall be checked with a straight edge 2M long.

Tiles shall enter not less than 10mm. under side skirting.

After the tiles have been laid, surplus cement grout shall be cleaned off.

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MORTAR AND BEDDING:-

Cement mortar for bedding shall be of proportion specified in items schedule and shall conform to the specification for materials, preparations etc, as specified under cement mortar. The amount of water added while preparing mortar shall be the minimum necessary to give sufficient plasticity for laying. Care shall be taken in preparation of the mortar to ensure that there are no hard lumps that would interfere with even bedding of the tiles. Before spreading the mortar bed the base shall be cleaned of all dirt, scum or laitance and loose materials and well wetted without forming any pools of water on the surface. The mortar of specified proportion and thickness shall then be even and smoothly spread over the base by use of screed battens to proper level or slope.

Cement mortar of thickness and proportion as specified in the schedule for dado shall be applied to the wall after preparing the wall surface as specified under cement plaster 20mm.thick and brought to correct line and plumb and the surface left rough to receive the tiles.

FIXING OF TILES FOR FLOORING:-

The tiles shall be laid on the bedding mortar when it is still plastic but has become sufficiently stiff to offer a fairly firm cushion for the tiles. Tiles which are fixed on the flooring adjoining the wall shall be so arranged that the surface on the round edge tiles shall correspond to the skirting or dado. Neat cement mortar grout 1:2 using fine sand (table III, zone-IV and as per I.S.383) of honey like consistency shall be spread over the bedding mortar just to cover as much area as can be tiled within half an hour. The edges of the tiles shall be smeared with neat white cement slurry and fixed in this grout one after the other, each tile being well pressed and gently tapped with a wooden mallet till it is properly bedded and in level with the adjoining tiles. There shall be no hollows in bed or joints. The joints, shall be kept as close as possible and in straight line. The joints between tiled shall not exceed 1.00 mm. in width. The joint shall be grouted with approved make white cement. After fixing the tiles, finally in an even plane or slope, the flooring shall be covered with wet sand and allowed undisturbed for 14 days.

FIXING TILES FOR DADO& SKIRTING/FACIA:

The dado work, shall be done only after fixing the tiles on the floor. Tiles shall be fixed when the cushioning mortar is still plastic and before it gets very stiff. The back

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of the tile shall be covered with this layer of cement mortar 1:3 using fine sand (table III, zone IV, I.S.383 of latest version) and the edge of the tile smeared with neat white cement slurry. The tile shall then be pressed in the mortar and gently tapped against the wall with a wooden mallet. The fixing shall be done from bottom of wall upwards without any hollows in the bed of joints. Each tile shall be as close as possible to one adjoining. The tiles shall be jointed with white cement slurry. Any thickness difference in the thickness of the tiles shall be arranged out in cushioning mortar so that all tiles faces are in one vertical plane.

While fixing tiles in dado work, care shall be taken to break the joints vertically. The top of the dado shall be touched up neatly with the rest of the plaster above.

After fixing the dado/skirting etc. they shall be kept continuously wet for 7 days.

If doors, windows or other openings are located within the dado area, the corners, sills, jambs etc. shall be provided with true right angles without any specials. The contractor will not be entitled to any extra claims on this account for cutting of tiles if required.

CLEANING:

After the tiles have been laid in a room or the days fixing work is completed, the surplus cement grout that may have come out of the joints shall cleaned off before it sets. After the complete curing, the dado or skirting over shall be washed thoroughly clean. In the case of flooring, once the floor has set, the floor shall be carefully washed clean and dried. When dry, the floor shall be covered with oil free dry saw dust. It shall be removed only after completion of the construction work and just before the floor is used.

POINTING AND FINISHING:

The joints shall be cleaned off with wire brush to a depth of 3 mm. and all dust and loose mortar removed. Joints shall then be flush pointed with white cement and floor kept wet for 7 days and then cleaned. Finished floor shall not sound hollow when tapped with a wooden mallet.

MODE OF MEASUREMENT:

Flooring/skirting shall be measured in sqm. Correct to two places of decimal. Length and breadth shall be measured correct to 1 cm. between the exposed surfaces of

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skirting or dado. No deductions shall be made for extra paid for any opening of area upto 0.1 sqm.

The rate shall include all the cost of labour and materials involved.

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EXTERIOR GRADE DESIGNER TILES

Scope

This specification shall include furnishing of all labour, materials, and equipment, necessary to complete the different types of flooring work as shown on drawings. Work under this section shall include: -

EXTERIOR GRADE DESINER TILES (UROCON/BETON TILES)

Any exterior cement tile for Steps (both tread & riser) Walkway areas, Entrances etc. should confirm with IS 1237 latest version. The thickness of the tile should be 20mm and the colour pigment used should be of very high grade and design as approved by NPCIL. Preparation of Surface should be carried out after all other works are completed including electrical fixtures fitting, colour wash, joinery fixation etc. Clean the existing surface concrete by chipping and wire brushing to remove any dead mortar etc complete. Water the surface and clean the dirt and dust by using pressure hose and brooms.

Fix up the levels with leveling instrument and button marked to minimum 20mm thick above zero level. Prepare cement mortar in the ration of 1:4 and lay the mortar without any voids by pressing and tapping with trowel. Wet the reverse side of the tile and apply the cement slurry, which should be in the form of paste on entire back side of the tile. Place the tiles Grout the joints with white cement mixed with colour pigment to match with colour of tile. Walking or any load applying should not be allowed for 48 hrs after laying is completed to main the level correct and in order

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3.0 MODE OF MEASUREMENT:

Paver blocks/tiles shall be measured in sqm. Correct to two places of decimal. Length and breadth shall be measured correct to 1 cm. between the outer to outer of tiles laid. The rate shall include all the cost of labour and materials involved.

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Chapter - XII

BRICK BAT COBA:

1.1 Materials:

The aggregate for brick bat coba shall be broken from good and thoroughly well burnt bricks. These shall be strong, durable, clean and free from impurities. They shall not contain any soft or powdering materials. The aggregate shall be 20mm to 10mm size and shall be approved by the Engineer-in-charge before use.

Lime to be used for preparing brick bat coba shall be of lime class B, conforming to IS 712 of latest version. Lime burnt from lime stone shall be used. All impurities, ashes or pieces improperly burnt shall be screened or picked out before slaking. It shall be in the form of lumps when brought to site of work and not in powder form. The lime shall not be slaked with water less than one week or more than two weeks before use.

1.2 Storage:

The slaked lime if stored, shall be kept in a weather proof and damp proof closed shed with impervious floor and sides to protect it against rain, moisture, weather and extraneous materials mixing with it, and shall be approved by the Engineer-in-charge.

1.3 Proportion:

The proportion for brick bat coba shall be 0.906 cum. (about 32cft) of brick bat to 0.34 cum (about 12 cft) of slaked lime.

1.4 Laying:

The concrete surface shall be thoroughly rubbed, cleaned of all set mortar, all dirt and dust and slightly wetted. The brick aggregate shall be soaked in water before mixing with lime. The brick bat coba shall be laid in an even layer and to the required thickness and slope so as to form ridge, hip or valley line as may be necessary and as indicated in the drawing or as directed by the Engineer-in-charge. The compaction shall be started immediately with wooden beaters and

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during the above process, the surface shall be constantly kept wet by sprinkling water observing the following precautions.

- a) Brick bat coba shall not be rammed with heavy iron rammers as brick aggregates are likely to be crushed into powder thereby., but shall be beaten lightly and rapidly with wooden beaters to get the required compaction and to obtain complete integration of brick bats and lime.
- b) While beating, fresh fracture may take place which may cause absorption of water from the mortar. Additional water may be sprinkled with beating in such cases as considered necessary by the Engineer-in-charge.
- c) The average thickness of coba shall be as specified in the drawings and the top of the coba shall be given slope or made level and edges taken into the walls and at junctions (vatas) as shown in the drawing and as directed by the Engineer-in-charge.

1.5 MODE OF MEASUREMENT:

The length and breadth of the surface area shall be measured to two places of decimals of a meter from the finished surface of wall and parapet and cubic contents to be worked out with average thickness of coba provided. Vatas shall not be measured separately. Rate shall include cost of preparation of surface, cost of materials, labour, making vatas etc.

1.6 MODE OF PAYMENT:

Rates Quoted by the Contractor for the work shall include cost of all materials and labour required to complete the work as per item description and as per above specification.

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CHAPTER - XIII

MARBLE SLAB WORKS

1.1 MARBLE STONE SLAB:

The colour and quality of marble slabs shall be of the kind of marble specified in item/drawings/as directed by the Engineer-in-charge. The marble from which the slabs are made, shall be of selected quality, hard, sound, dense and homogenous in texture, free from cracks, decay, weathering and flaws. Before starting the work, the contractor shall get the samples of marble slabs approved by the Engineer-in-charge. All slabs which goes into work shall strictly conform to the samples, failing which the entire materials are likely to be rejected.

The slabs shall be machine polished and machine cut to the dimensions specified in items of schedules of quantities drawings and as directed by the Engineer-in-charge.

1.2 DRESSING OF SLABS:

Every stone shall be cut to the required size and shape, fine dressed on all sides to the full depth so that a straight edge laid along the side of the stone is full in contact with it. The top surface shall also be fine dressed to remove all waviness. The top surface of slabs shall be machine polished and exposed edges machine cut, or as specified in the item and free from chippings and the exposed surface shall be full/half rounded as directed.

The thickness specified for the slabs shall be with a tolerance of +2mm. The minimum size of stone to be used for various items shall be as mentioned in the schedule of quantities/drawings of this tender. Marble stone of approved smaller sizes other than mentioned in the schedule of quantities, if required for bands, borders, flooring etc. shall be provided and laid as directed by the Engineer-in-charge.

1.3 BEDDING/BACKING MORTAR:

The bedding/backing shall be of cement mortar/lime mortar of mix and thickness as specified in the description of the item.

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1.3.1 Mixing: The mixing of mortar shall be done in mechanical mixer or hand mixing as specified/as directed by the Engineer-in-Charge.

- a) **Mixing in Mechanical Mixer:-** Cement and sand in the specified proportion shall be mixed dry thoroughly in a mixer. Water shall then be added gradually and wet mixing continued for at least one minute. Care shall be taken not to add more water than that which shall bring the mortar to the consistency of stiff paste.

Only the quantity of mortar, which can be used within 30 minutes of its mixing shall be prepared at a time.

Mixer shall be cleaned with water each time, before suspending the work.

- b) **Hand Mixing:** If approved Engineer-in-Charge, hand mixing shall be allowed. The measured quantity of sand shall be levelled on clean masonry platform and cement bags emptied on top. In hand mixing, the quantity of cement shall be increased by 5% over the approved constant, with no extra cost to the Department. The cement and sand shall be thoroughly mixed dry by being turned over and over, backwards and forwards, several times till the mixture gives an uniform colour. The quantity of dry mix which can be used within 30 minutes shall then be mixed on masonry through with just sufficient quantity of water to bring the mortar to the consistency of stiff paste.
- c) **General:** Mortar shall be used as soon as possible after mixing and before it has begun to set, and in any case within 30 minutes after the water is added to the dry mixture. Mortar unused for more than 30 minutes shall be rejected and removed from the site of work immediately.

1.4 LAYING FLOORING/ WASH BASIN COUNTERS:

Before laying the cement mortar bedding/backing, the concrete/brick, floor/wall surfaces shall be thoroughly hacked, cleaned of all mortar scales, concrete lumps etc., brushed, washed with water to remove mud, dirt etc. from the surface and shall be thoroughly wetted. Until and unless the surface is approved by the Engineer-in-Charge, the flooring shall not be started. A bedding of cement mortar of 20mm minimum thickness. The marble slabs shall be thoroughly washed and cleaned and then be laid on the bedding/backing with required cement slurry. All slabs shall be truly and evenly set in a thick cement slurry or paste like consistency applied to the sides and bottom and over the

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prepared base. The slabs shall then be temped down with a wooden mallet they are exactly in true plane and line with adjacent slabs. All slabs shall be extended upto the unplastered surface of masonry walls/RCC columns/RCC walls. The Marble slab to be cut as required shapes to keep the wash basin as per the requirements and exposed surfaces should be half/full round nosing as directed. The slabs shall be close jointed in matching cement slurry and the cement slurry coming out through the thin joints shall be immediately wiped clean. All the exposed surfaces of the Marble in Staircases/ window sills etc to be half/full round nosing to be done.

1.5 MARBLE SLAB SHELVES

Only machine cut and machine polished marble slab will be used. Marble to be used shall be of approved size, colour, type of veins and laid as specified in schedule of quantities or as directed by the Engineer-in-Charge. Recess to be made in the Masonry/RCC areas of required to fix the Marble in position and finishing the joints neatly with Cement mortar as specified in the schedule or as directed.

1.6 MEASUREMENT:

Marble slab as laid as directed, shall be measured in square metre correct to two places of decimal. The length and breadth shall be measured between the finished faces correct to two places of decimal of metre. No deduction shall be made nor extra paid for any opening of area upto 0.05 sqm. Nothing extra shall be paid for working at different levels.

NOTE: Wastage in marble slab cutting to get the required dimensions, charges for Half/full round nosing, buffing, making holes for utilities such as staircase pipes,taps etc as specified in drawing or as directed by the Engineer-in-Charge shall be deemed to be considered by the contractor while quoting the rate for work. The work shall be measured as above and no extra claim will be entertained on this account.

1.7 RATE:

The rate shall include the cost of all materials, transport, tools, plants scaffolding and labour involved in all operations described above.

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CHAPTER – XIV

GRANITE WORKS

1.1 Scope of Work:

The work shall include providing prepolished granite for the buildings in walls, columns, sills, jambs, sides of beams/ lintels/ columns, fascades, floors, staircases, Kitchen counters, copings, balconies, jalis, skirtings, counters, upstands, bands in interior/ exterior works and in any other locations and situations, whether to RCC or concrete or brick masonry or steel/ metal, all to design, patterns, shapes and thicknesses, to details as shown on the drawings or as specified or as directed by the Engineer complete in all respects to give the quality of finished work as desired by and to the entire satisfaction of the Engineer.

The work shall be carried out by an experienced specialist in Granite works who shall be appointed only after prior approval of the Engineer.

1.2 Material:

All stone shall be supplied prepolished, duly table rubbed and polished at the Contractor's work, using cutting and polishing stones of different grades (no. 60, 120, 220 and 320) and latter cleaned with oxalic acid applied at 33 gm/sqm so as to give a plane, true and high quality mirror polished smooth, even, unwarped surfaces with square cut edges.

The Classification for Granite shall be as per SOQR of the tender.

The maximum water absorption percentage and minimum compressive strength shall be as given in Table-1 below:

Table-1

Type of Stone	Maximum Water Absorption percentage by weight	Minimum Compressive strength kg/sqcm
Granite	0.50	1000

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Note-1: Test for compressive strength shall be carried out as laid down in IS:1121 (Part 1).

Note-2: Test for water absorption shall be carried out as laid down in IS:1124.

Materials for Mortar:

- (a) Cement: Portland pozzolana cement conforming to IS:1489 shall be used. The cement shall be non-staining to the stone for cladding. The total chloride content of the cement shall not exceed 0.05%.
- (b) White Cement: This shall conform to IS:8042. The cement shall be non-staining to the stone for cladding.
- (c) Sand: Crushed stone shall be used to match the stonework and shall be graded to comply with the approved sample.
- (d) Water: Shall conform to the requirements of IS:456.

1.3 Samples of Stone and Workmanship:

The Contractor shall submit samples of the various stones, to sizes as required by the Engineer for approval as per items in the SOQR of the tender. The stones shall be dressed as specified and directed by the Engineer. The approved sample of stones shall be retained by the Engineer. The Contractor shall arrange bulk supply from the similar source as per the approved sample stones.

1.4 Handling and Storing Materials:

The Contractor shall handle and store materials such that any particular delivery or consignment can be identified. Incompatible materials shall be stored separately.

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All stone shall be stacked on a clean, dry, free-draining surface, be prevented from contact with soil and shall be protected from extreme weather conditions. The stone shall be covered with non-staining tarpaulins and protected from rain.

The Contractor shall take steps to ensure that there is no danger of breaking and damage to the stone. The storage areas shall be clear of all other operations. The Contractor shall prevent damage to the stone due to handling and transport. Handling shall be planned and reduced to a minimum. The storage, handling, lifting and transporting methods shall be subjected to the approval of the Engineer.

1.5 Fixing arrangement of granite slab:

1.5.1 Mortar (for floors/Kitchen counter and other areas with wet cladding)

BEDDING/BACKING MORTAR:

The bedding/backing shall be of cement mortar/lime mortar of mix and thickness as specified in the description of the item.

Mixing: The mixing of mortar shall be done in mechanical mixer or hand mixing as specified/as directed by the Engineer-in-Charge.

- a) Mixing in Mechanical Mixer:- Cement and sand in the specified proportion shall be mixed dry thoroughly in a mixer. Water shall then be added gradually and wet mixing continued for at least one minute. Care shall be taken not to add more water than that which shall bring the mortar to the consistency of stiff paste.

Only the quantity of mortar, which can be used within 30 minutes of its mixing shall be prepared at a time.

Mixer shall be cleaned with water each time, before suspending the work.

- b) Hand Mixing: If approved Engineer-in-Charge, hand mixing shall be allowed. The measured quantity of sand shall be levelled on clean masonry platform and cement bags emptied on top. In hand mixing, the quantity of cement shall be increased by 5% over the approved constant, with no extra cost to the Department. The cement and sand shall be thoroughly mixed dry by being turned

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over and over, backwards and forwards, several times till the mixture gives an uniform colour. The quantity of dry mix which can be used within 30 minutes shall then be mixed on masonry through with just sufficient quantity of water to bring the mortar to the consistency of stiff paste.

- c) General: Mortar shall be used as soon as possible after mixing and before it has begun to set, and in any case within 30 minutes after the water is added to the dry mixture. Mortar unused for more than 30 minutes shall be rejected and removed from the site of work immediately.

Dry cladding:

The fixing of granite slab shall be done with dry cladding on the instructed surface. The bracket shall be fixed in grid pattern and fixed with anchorage as per arrangement shown in the drawing. Utmost care shall be taken for accuracy of size finish and phase to be maintained in true plane. The work shall be finished to the satisfaction of the Engineer. For wall cladding tile fixing adhesive to be used without any extra cost.

Matching Grains and Colour:

All stone shall be sorted for colour and grains before laying. The matching of grains/colour shall be carried out as approved by the Engineer. No variation of type of grain or colour shall be allowed in any one area.

Design and Pattern:

All work shall be laid as per design, detail, pattern, colours, sizes and dimensions given on the drawings and as directed by Engineer in charge. Any modifications and variations at site shall be reflected in adjustment in design as per the approval of the Engineer. All junctions, rebates, nosings, corners shall have square, curved or shaped moulding as desired and as shown on the drawings.

Service and Other Outlets:

Before any work is to be taken up, the sizes and the pattern of stones shall be laid out, together with the location of electrical, sanitary outlets and those of all other services and approval sought from the Engineer. Thereafter the stones shall be

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laid out on the floor showing pattern of grain, etc. and work shall only be carried out after obtaining approval of the Engineer.

Dressing and Rubbing & Nosing:

Every stone shall be machine cut to the required size and shape, free from waviness and to give truly vertical, horizontal, radial or circular joints as required. All visible angles and edges shall be true, square and free from any chippings. The surfaces of the stones coming in contact with backing shall not be polished and exposed corners should be provided with nosing as required half/full round.

Preliminary Surface Preparation for Dado:

The Contractor shall undertake everything necessary to obtain a satisfactory bond between the backgrounds, backings and finishings. Such work shall include but not be limited to the following:

- (a) Withholding application until curing and drying shrinkage of the structural backgrounds are achieved.
- (b) Fungicidal wash as approved to remove any organic growth.
- (c) Removal of any greasy deposits by scrubbing with water and approved detergent.
- (d) Final brushing to remove laitance, efflorescence or loose material.
- (e) Wetting to reduce suction or to obtain uniformity of suction.

Laying:

The base mortar, comprising portland pozzolana cement and coarse sand of mix as specified or directed by the Engineer, shall be laid over the area to be tiled, well compacted and levelled. Thereafter granite shall be laid with a floating coat of white cement slurry with pigment.

Before commencement of flooring work all the joints of the brickwork/ block work shall be raked open to provide good key for the base coat of the plaster. Nothing extra shall be paid for raking the joints.

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The thickness specified for stonework shall be with a tolerance of $\pm 2\text{mm}$. However, once one thickness is established or adopted the same shall be followed throughout for the rest of the work.

Jointing:

The stone shall be fixed with consistent joint width by correct use of spacer lugs so as to provide hairline (maximum 1mm thick) joints.

All joints shall be filled solid with 1:2 mortar (1 white cement with pigment: 2 sand) except for projecting members of overhanging cornices which may be provided with hollow bedding where approved by the Engineer. Excess mortar shall be cleaned off immediately so that no mortar is visible on the face of the stone cladding. The stone cladding shall be properly cured for at least 7 days.

No stone shall bridge the expansion/ separation gap provided in the structure.

Finishes for Granite Work:

The finishes for granite work shall be either mirror polished or flamed as specified or as directed by the Engineer.

Waxing:

Granite work shall not be wax polished after finishing.

Protection:

The Contractor shall protect all work until handing over. The work shall be protected with heavy polyethylene sheeting.

Measurements:

All dimensions shall be measured correct to a cm. In case of radial, circular, polygonal, angular or curved slabs, the same shall be measured net as actually laid and not as per the dimensions of the circumscribing rectangles.

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Only the visible area of stone shall be measured. No stonework portions hidden in joints, rebates under skirtings, etc. shall be measured. Only one surface of any one stone shall be measured.

In the case of inlay work the granite shall be measured in full and inlay (dibbi) shall be paid for separately i.e. no deduction shall be made for inlay (dibbi) work. The inlay work using different granite shall be measured under the respective item of granite. The above provision of inlay (dibbi) work shall be restricted to inlay work not exceeding 150 mm X 150 mm in size.

The area shall be calculated in sqm nearest to two decimals.

Rates:

The rates quoted by the Contractor against the respective items of the Schedule of Quantities for the Granite works shall include all labour, material, scaffolding, tool and tackles, making full/half round nosing, making holes for service utilities consumables, cutting granite for fixing kitchen sink etc protective measures to be carried out, etc. all complete as per specifications.

Kudankulam Nuclear Power Project	Construction of 203 Nos of Residential Quarters comprising of 40 Nos of E-type (G+10 floor-1 Tower), 80 Nos of D-Special quarters (G+10 floor-2 Tower), 80 Nos of B-type quarters (G+10 floor-2 Tower) and 3 Nos of F Type quarters (G+1 floor) at Anuvijay Township
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CHAPTER– XV

WOOD WORK FOR FRAMES

1.1 WOOD WORK:-

All timber mentioned in the item in schedule of quantities shall be from the heart of a sound tree of nature growth entirely free from sap wood. It shall be uniform in texture, straight in fiber and shall be well and properly seasoned. It will be free from large, loose, dead or cluster knots, wedges, injuries, open shakes, borer holes, rot, decay date, discoloration, soft or spongy spot, hollow pockets, pith or centre bore and all other defects or any other damages of harmful nature which will affect the strength, durability, appearance and its usefulness for the purpose for which it is required. Only properly well seasoned chemically treated rubber wood shall be used. The samples of species to be used shall be submitted by the contractor with the Engineer-in-charge before commencement of the work.

The workmanship shall be of best quality. All wrought timber is to be sawn, planned, drilled or otherwise machine worked to the correct sizes and shall be as indicated in drawing or as specified. All joinery work shall fit truly and without wedging or filling. Wood work in frames shall be wrought.

Individual members shall be of continuous length. The finished size and sections shall be as per drawing or as specified. The heads and posts of frames shall be through tennoned into the mortises to the full widths as shown in the drawing. All necessary mortising, tennoning, grooving, matching, tonguing, housing rebate and other necessary works for correct jointing shall be carried out, in the best workmanship like manner. Joints not specifically indicated shall be recognised form of approved joints for each position. The frames shall be provided with 6 nos, approved iron hold fasts, fabricated out of 40 x 5 mm. section, 300 mm, long (140 mm. long for cross partitions) M.S. flats with spliced end in case they are abutting brick masonry works. These M.S, hold fasts shall be embedded in plain cement concrete 1:3:6 block of size 300 x 75 mm. depth (100 x 75 mm. for cross partitions) and for full width of brick masonry. For frames abutting concrete surfaces, 6 nos., 100 mm. long coach screws with sunk heads minimum 10 mm.

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from face of frames, shall be provided. Each screw shall be secured in concrete in the pre-drilled holes to receive the screws. Top members of door frames for opening exceeding 1.25m. in width, shall be secured with a coach screw 100mm. long in centre of member. All other T.W. scantlings shall be fixed to structural openings with wood screws of suitable size & rawl plug so as to get in effective hold of at least 40mm. Suitable hard wood plugs shall be provided to conceal the screw heads. The frame shall rest on concrete sub-base in ground floor or structural floor slab in case of upper floors, the extra length of sides of frames thus embedded below finished floors shall not be measured for payment. All parts of wood work resting on or set in masonry or concrete shall be well painted with two coats of bituminous paint or solignum as directed by the Engineer-in-charge, prior to installations. All nails, screws, hold fasts, plates, plugs, pins required for wood work joinery and fixing work, shall be provided by the contractor, at his own cost. All materials shall be approved by Engineer-in-charge before using in works. Painting of frames shall be carried out as per specifications for painting for wood work as per relevant items

All the embedded timber shall be given two coats of hot tar or solignum before erection. This is incidental to the item and shall not be measured for payment.

1.2 TESTS:

Tests shall be conducted, if required, by the Department at contractors cost and acceptance criteria shall be as per relevant IS Standards.

1.3 MODE OF MEASUREMENT:

The Work covered under the respective items in schedule and the above specifications shall be measured follows:

The work cubic contents for wood work shall be measured for the finished size, limiting to those shown in the drawings or ordered by the Engineer-in-charge. The cross sectional dimensions shall be measured equivalent to nearest enclosing rectangle (least rectangle/square) for wrought and planed sizes. The cubical content shall be worked out correct puts three places of decimals of a cubic metre. The frames embedded below finished floor shall not be measured.

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The square meter areas for shutters shall be measured for the exposed surfaces of shutter between frames from inside or outside whichever is more. The linear dimensions shall be measured upto two places of decimals of a metre. The area for payment shall be worked out correct upto two places of decimals of square metre. The rate for shutters shall include:

- i) Cost of supply assembly and erecting in position fixed in masonry/concrete with required number of M.S.holdfasts of size 40 width x 5mm thick & 300 mm long frame and providing fischer screws of required length for columns wherever required all as directed for the various sizes of structural openings including making necessary rebate/stopper for fixing shutters as per drawings and specifications
- ii) Cost of labour for making adjustments in frames, if required, shutters and also for fixing required fittings and fixtures.
- iii) The cost of all Hardware fixtures required for frames/shutters as mentioned in the schedule of quantities.

Kudankulam Nuclear Power Project	Construction of 203 Nos of Residential Quarters comprising of 40 Nos of E-type (G+10 floor-1 Tower), 80 Nos of D-Special quarters (G+10 floor-2 Tower), 80 Nos of B-type quarters (G+10 floor-2 Tower) and 3 Nos of F Type quarters (G+1 floor) at Anuvijay Township
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CHAPTER – XVI

MOULDED SKIN & FLUSH DOOR & WIRE MESH DOOR, PVC DOOR SHUTTERS

1.1 Moulded Skin Door Shutters

- i) Moulded Skin Door shutters conforming to the IS specification IS:15380 of latest version. The finished thickness of the shutter shall be of 35mm as mentioned in the schedule of items.
- ii) The core for single leaf (four panels) Moulded skin doors manufactured from BORON based chemically treated and vacuum seasoned wood with minimum 3mm thick sheet of fiberboard HDF Skin as per IS-15380 of latest version.
- iii) Lipping shall be provided wherever specifically asked for and also where the core frame is not of the same species as that of the core. Lipping shall be internal.
- iv) Adhesive used for bonding the face skins and core shall be phenol formaldehyde synthetic resin adhesive conforming to BWP grade of IS 848.
- v) The shutter shall be free from twist of warp in its plane and shall have all the four edges square.
- vi) Wherever peep windows are to be provided, the opening in the shutter for the same shall have treated rubber wood lipping all round and the glass shall be fixed with treated rubber wood beading on either side.
- vii) Tests shall be conducted, if required by the department of contractors cost and acceptance criteria shall be as per IS:15380 of latest version.

1.2 Flush Door Shutters

Kudankulam Nuclear Power Project	Construction of 203 Nos of Residential Quarters comprising of 40 Nos of E-type (G+10 floor-1 Tower), 80 Nos of D-Special quarters (G+10 floor-2 Tower), 80 Nos of B-type quarters (G+10 floor-2 Tower) and 3 Nos of F Type quarters (G+1 floor) at Anuvijay Township
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- i) Solid core flush door shutters conforming to the IS specification 2202 – of latest version (specification for wooden flush door shutter-solid core type). The finished thickness of the shutter shall be of 30 mm as mentioned in the schedule of items.
- ii) The core for solid core doors shall be of single leaf manufactured from BORON based chemically treated and vacuum seasoned RUBBERWOOD, core is framed in treated and seasoned rubber wood battens and strengthened by a layer of cross-bands, face veneers encompass both sides of the core, bonded with phenol formaldehyde resin and permanent type preservatives, under the cross-bonding process and internally lipped with treated rubber wood for various structural openings.
- iii) Lipping shall be provided wherever specifically asked for and also where the core frame is not of the same species as that of the core. Lipping shall be internal.
- iv) The shutter shall be free from twist or warp in its plane and shall have all the four edges square.
- v) Wherever peep windows are to be provided, the opening in the shutter for the same shall have treated rubber wood lipping all round and the glass shall be fixed with treated rubber wood beading on either side.
- vi) Tests shall be conducted, if required by the department of contractors cost and acceptance criteria shall be as per IS-2202.

1.3 Wire mesh Door Shutters

- i) Wire mesh door shutters conforming to the relevant IS specifications. The finished thickness of the shutter shall be of 35 mm as mentioned in the schedule of items.

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- ii) The wire mesh door shutters should be made of Malaysian Vengai wood Panels with stiles and top rails of 100 mm wide, 175 mm for bottom and middle rails
- iii) Providing stainless steel mesh of wire 0.56mm dia with average aperture width of 1.16 mm fixed with Malaysian Vengai wood beading 12 x15 mm sized.
- iv) The shutter shall be free from twist or warp in its plane and shall have all the four edges square.
- v) Tests shall be conducted, if required by the department of contractors cost and acceptance criteria shall be as per standards.

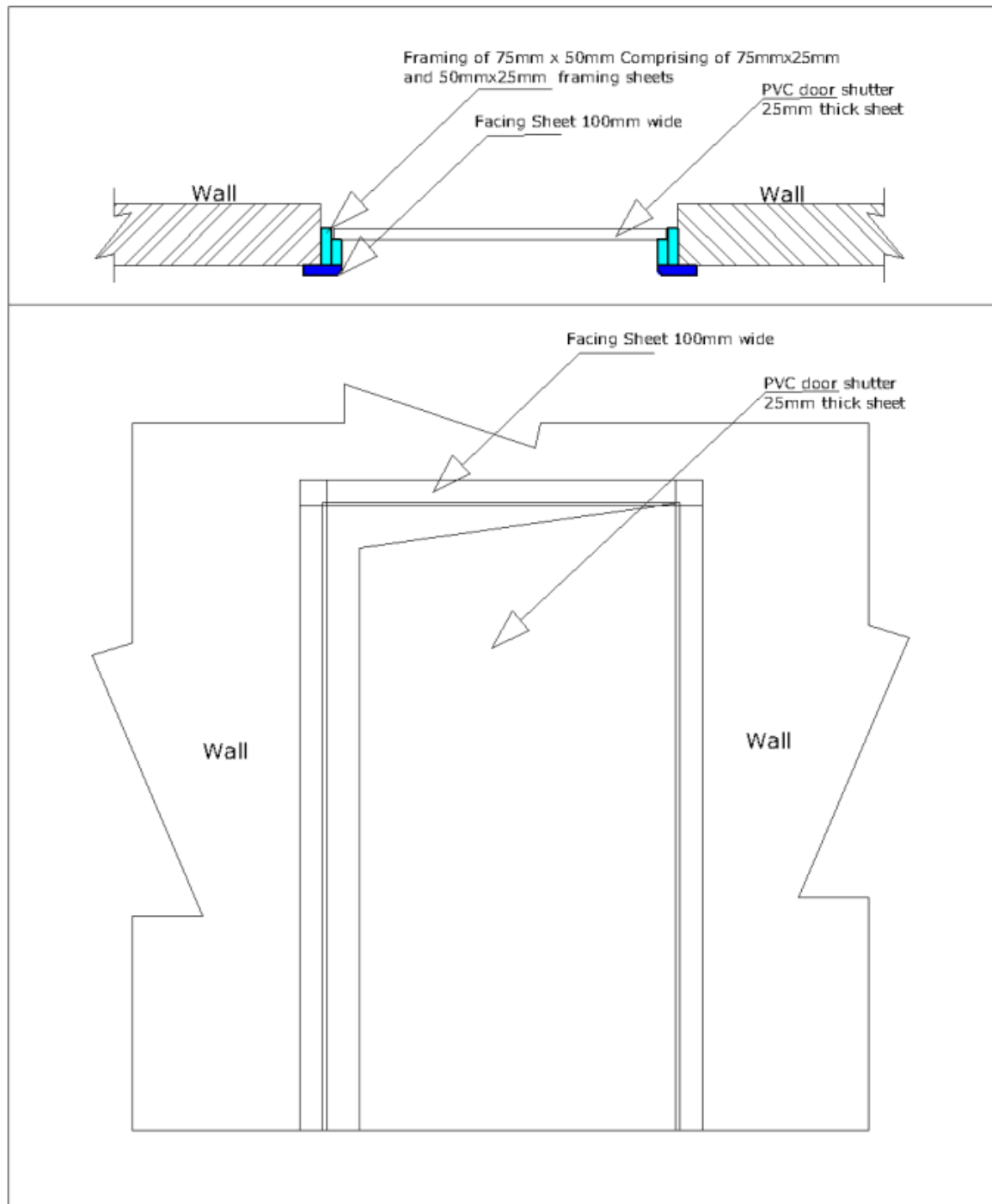
1.5 PVC Doors/Wardrobes/Kitchen Cabinets

- i) PVC door (frames & shutters) conforming to the item specifications of SOQR to be supplied. The finished product of Door frames shall be purchased from the supplier/manufacturer/stockiest/distributor etc with due approval from NPCIL. In this regard, schematic drawings of the same shall be submitted by the contractor for approval. Making of frames by using local carpenters/artisans (at site/ godown etc) are not permitted to ensure better quality product.

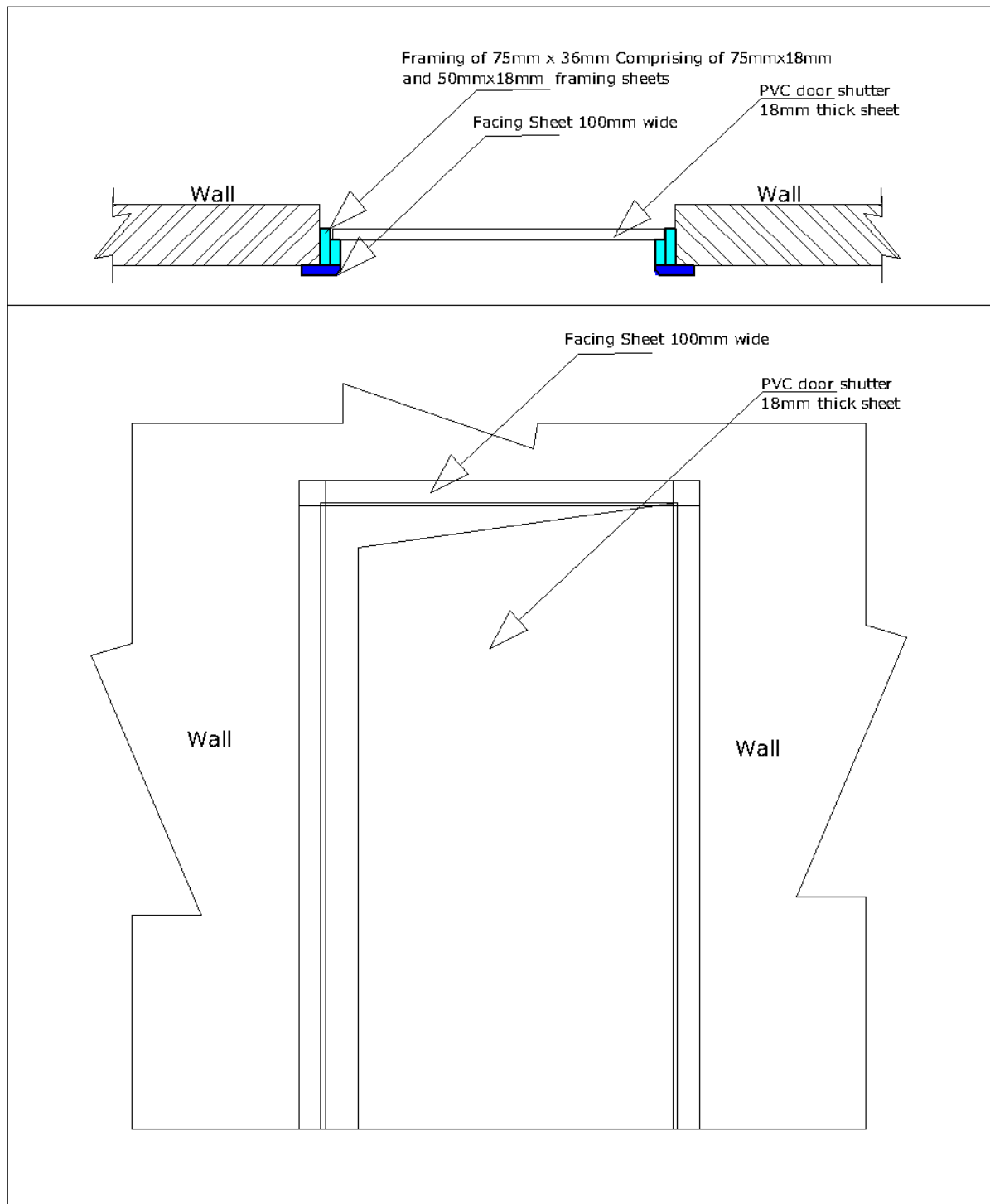
For making Door frame and shutters, the PVC Sheets to be cut into required shapes/dimensions as per design and requirements and jointing the same by using approved quality fevicol SR/Araldite materials as per requirements and fixing the same using required fasteners/screws etc as per the direction of NPCIL. The frame sheet should be cut in full size of the height of the door in a single piece and there should not be any joints permitted in the height/top portion view/elevation portion of the door frames/shutters etc. All the exposed surfaces of the sheet cut areas/lipping areas of Door frames and shutters has to be finished with edge banding tape/sheets of applicable colour of doors.

ii) The Framing sections of PVC door frames shall be as follows:

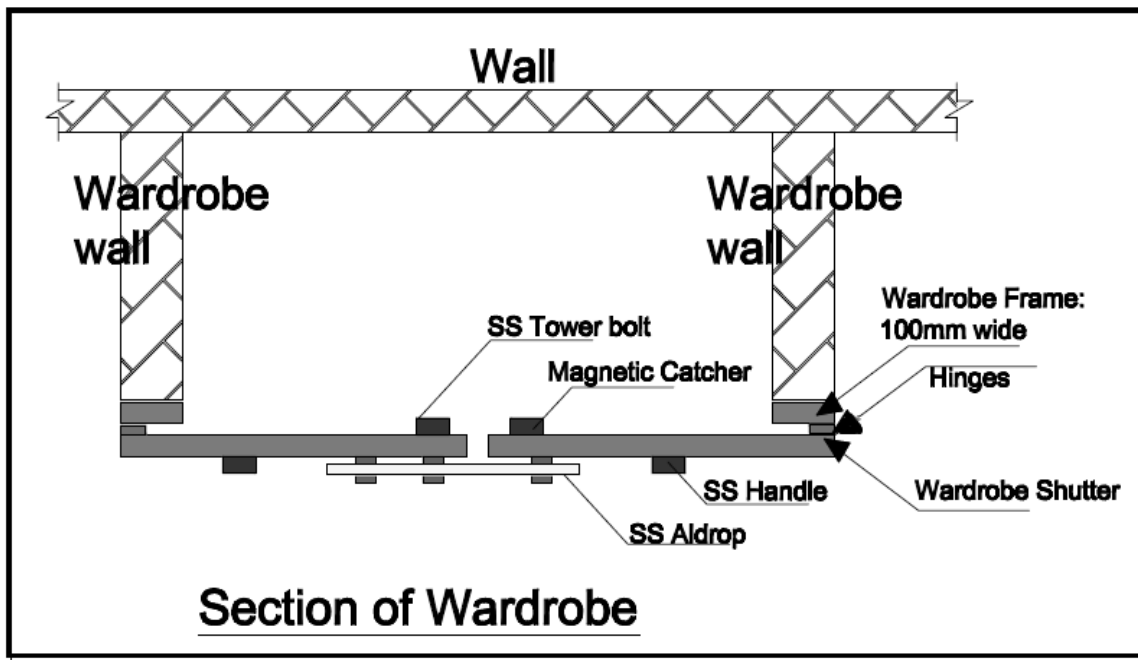
a) Doors Inside Flat:



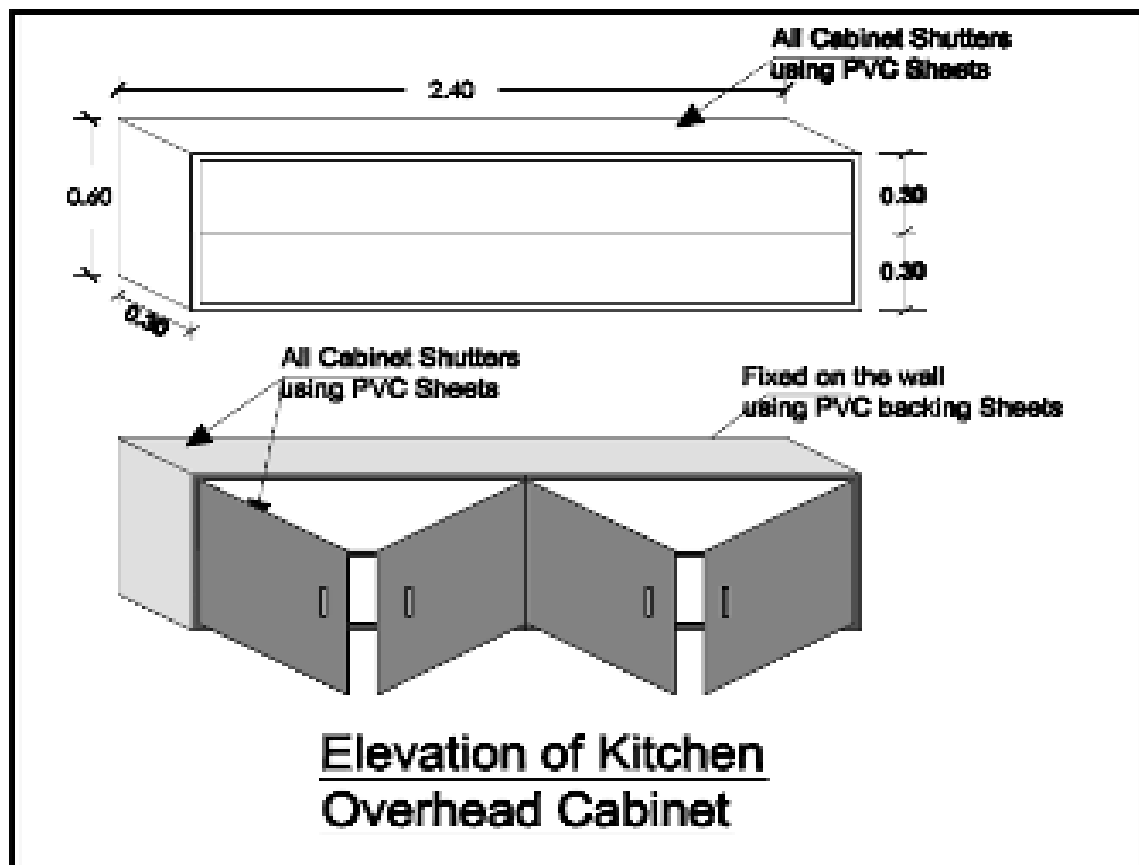
b) Toilet Doors:



c) The Section details of PVC Wardrobe are as follows:



d) The Section details of PVC Kitchen Cabinet are as follows:



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1.4 Fixtures

Fixtures for doors, windows, furniture etc. shall be as shown on drawing or specified in the “Schedule of Fixtures”. These shall be of heavy type, best quality and from approved manufacturer. Contractor shall have to mention/submit the names of the manufacturer for different types of joinery hard wares, fittings and fixtures. Samples of each type of fittings shall have to be submitted to the Engineer – in – charge for obtaining approval before bulk supply.

1.5 Workmanship

General

- i) The workmanship shall be of the best quality and all the faces of the door shutter shall be at right angles.
- ii) All carpenter's work shall be accurately set out and framed together and securely fixed in the best possible manner and with properly made joints. All joints must fit accurately without wedging or filling.
- iii) The joiner shall perform all necessary mortising, tenoning, grooving, matching, tonguing, housing, rebating and all other works necessary for correct jointing. Joiner shall also carry out all works necessary for the proper construction of all framing, linings etc, and for their support and fixing in the building.
- iv) Framing timber and other works shall be close - fittings with proper wood joinery, accurately set to required lines or levels and rigidly secured in places. The surface of frames etc. which will come in contact with masonry after fixing, shall be given two coats of approved paint before fixing. Mastic caulking shall be done after fixing external door and window frames. Special care shall be taken to match the grain of timber or plywood which will be subsequently polished. Screwing or nailing will not be permitted to the edge of plywood or chip - board sheets.

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- v) All surfaces to be glued are to be kept clean, free from dirt, dust, sawdust, oil and other contamination. Adequate pressures should be applied to glued joints to ensure intimate contact and maintained whilst the glue is setting.
- vi) The door shall be erected true to line level and plumb. They shall be upright, square and free from twists.
- vii) The two sides of the frame shall be adequately embedded into the floor with minimum 50mm depth.

1.6 Finish

All carpentry work after finishing shall be sand papered smooth. A prime coat paint (as per relevant item) shall be given after inspection of the Engineer –in-charge to all surfaces other than those which shall be subsequently polished or covered with laminated plastic sheet. The workmanship & finish of the face panels shall be in conformity with those specified in relevant I.S.

1.8 General

These shall conform to drawings in all details. Samples in each type of doors/wardrobes/cabinets to be made by the Contractor for the approval of Engineer - in - charge in advance. No unsightly nail marks etc. shall be permitted Plywood grains shall be matched to give a uniform and pleasing appearance to be painted.

1.9 Rates

Rates shall be unit rates including preservatives, shops coats, primers, varnishing, polishing etc. against items mentioned in Schedule of quantities & prices. No separate payment will be made for fixing caulking etc. unless separately provided for in schedule.

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2.0 Mode of measurement

The shutter shall be measured for actual outer area of shutters for different thickness and types described in schedule of quantities & rates.

The quoted rate shall include the following:

- a) Cost of shutters/frames including providing and fixing all hardware fittings required as mentioned in the item.
- b) Cost of preparing, fixing, erecting and maintaining in position the entire door, shutter and fittings and providing stainless steel mesh of wire 0.56mm dia with average aperture width of 1.16 mm fixed with treated rubber wood beading 12 x15 mm for Wire mesh door shutters.
- c) All necessary labour, tools, tackles, plant and equipment and other incidental work for the satisfactory completion of the work as per these specifications.

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CHAPTER – XVII

GLASS AND GLAZING

1.1 SCOPE OF WORK:

The work covered by this specification include furnishing and fixing the glass panes to wood/UPVC windows and ventilators, strictly in accordance with these specifications and drawings.

1.2 GLASS:

The glass shall be of frosted/pinned glass with thickness and makes as per SOQR, as specified and it shall be free from bubbles, flaws specks, waves, air holes, distortion, scratches or other defects. The glasses in bulk quantities shall be brought to site in Makers original pickings. The glass shall be of required thickness as mentioned in the items of schedule of quantities and/or drawing or as directed by the Engineer-in-charge. The contractor shall submit the sample of the glass which he proposes to use on the work and only such approved quality of glass shall be used in the works. The glass brought to site shall be protected against damages. Wherever frosted (obscure) glass is mentioned in the item of schedule of quantities and/or shown in drawings, the glass shall be of sand blown pattern and shall also be got approved by the Engineer-in-charge.

1.3 GLAZING:

The glass panes shall be fixed to the frame as mentioned above with approved Neoprene dry set glazing gasket (of best quality and approved make) with snap-in-bevelled white anodized mat finished aluminium metal glazing stops inside and outside. In the fixed side and transom light, the thickness of glass or panel shall be accommodated by the screw down glazing stops. The glass panels shall be fixed firmly and truly parallel to the plane of frames. All damages or breakage during glazing shall be made good at the contractors own cost till the work is properly taken over by the Engineer-in-charge.

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1.4 GENERAL:

After the Inspection is over and permitted by the Engineer-in-charge, the glass panes shall be deemed off any labels, paint smears and spots shall be washed from both the side and all glazing left clear, perfect and free from ratting. The Contractor shall provided all the scaffolding, tools and plants for fixing the glass panes at his own cost.

1.5 RATES:

The rate quoted shall include cost of all materials including hardware, fittings, fixtures of approved types including all taxes, duties etc. tools, plants, labour involved in all the operations described above, fixing in final position including submitting shop drawings etc. and all incidentals to the job involved.

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Kudankulam Nuclear Power Project	Construction of 203 Nos of Residential Quarters comprising of 40 Nos of E-type (G+10 floor-1 Tower), 80 Nos of D-Special quarters (G+10 floor-2 Tower), 80 Nos of B-type quarters (G+10 floor-2 Tower) and 3 Nos of F Type quarters (G+1 floor) at Anuvijay Township
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Chapter - XVIII

PAINTING

1.1. SCOPE OF WORK

The work covered under these specifications consist of furnishing the various of paints (Supply and application works) and also the workmanship for these items, in strict compliance with these specifications, which are given in detail here-in after with the item of schedule of quantities.

1.2. MATERIALS

Paints, oils, varnishes etc of approved brand and manufacture shall be used/supplied. Ready mixed paints as received from the manufacturer without any admixture shall be used.

If for any reason, thinning is necessary in case of ready mixed paint, the brand of thinner recommended by the manufacturer or as instructed by the Engineer-in-charge shall be used. Approved paints, oil or varnishes shall be brought to the site of work by the contractor in their original containers in sealed condition. The materials shall be brought in at a time in adequate quantities to suffice for the whole work or atleast a fortnights work. The materials shall be kept in the joint custody of the contractor and the Engineer-in-charge. The empties shall not be removed from the site of work, till the relevant item of work has been completed and permission obtained from the Engineer-in-charge.

The contractor shall associate the chemist of paint manufacturers before commencement of work, during and after the completion of work who shall certify the suitability of the surface to receive painting and the paint before use etc. Intermediate Tests on paints shall be conducted in approved Labs and the testing charges are borne to the contractor.

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1.3. COMMENCING WORK

Scaffolding : Wherever scaffolding is necessary, it shall be erected on double supports tied together by horizontal pieces, over which scaffolding planks shall rest on or touch the surface which is being painted.

Where ladders are used, pieces of old gunny bags shall be tied on their tops to avoid damage or scratches to walls.

As the type of building is Multistoried of 11 storey (35m height from Ground level) the external painting has to be carried out only by Man lifter of adequate height on contractors scope. Painting using "Robe/Jula" is not permitted.

For painting of the ceiling, proper stage scaffolding shall be erected.

Painting, except the priming coat, shall generally be taken in hand after all other builders work, practically finished.

The rooms should be thoroughly swept put and the entire building cleaned up at least one day in advance of the paint work being started.

1.4. PREPARATION OF SURFACE :

The surface shall be thoroughly cleaned. All dirt, rust, scales, smoke and grease shall be thoroughly removed before painting is started. Minor patches if any in plastered/form finished surfaces shall be repaired and finished in line and level in C.M. 1:1 and cracks & crevices shall be filled with approved filler, by the contractor at no extra cost to the Department. The prepared surface shall have received the approval of the Engineer-in-Charge after inspection, before painting is commenced.

1.5. APPLICATION

Before pouring into smaller containers for use, the paint shall be stirred thoroughly in its containers. When applying also the paint shall be continuously stirred in the smaller containers so that consistency is kept uniform.

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The external surfaces of the buildings under reference including the RCC Jalli, fins and the panels above and below the window etc shall be furnished in different colours of approved shade. The contractor will make suitable samples at site for Departments approval before taking up the work in hand and they will be allowed to proceed with the work only after getting Departments approval for the same.

The painting shall be laid on evenly and smoothly by means of crossing and laying off, the later in the direction of the grain in case of wood. The crossing and laying off consists of covering the area with paint, brushing the surface hard for the first time and then brushing alternatively in opposite directions two or three time and then finally brushing lightly in direction at right angles to the same. In this process, no brush marks shall be left after the laying off is finished. The full process of crossing and laying will constitute one coat. If painting is done using Painting roller brush, the process of crossing and laying will also constitute one coat.

Where so stipulated, the painting shall be done with spraying. Spray machine used may be (a) a high pressure (small air aperture) type or (b) a low pressure (large air gap) type, depending on the nature and location of work to be carried out. Skilled and experienced workmen shall be employed for this class of work. Paints used shall be brought to the requisite consistency by adding a suitable thinner. Spraying should be done only when dry condition prevails.

Each coat shall be allowed to dry out thoroughly and rubbed smooth before the next coat is applied. This should be facilitated by thorough ventilation.

Each coat except the last coat, shall be lightly rubbed down with sand paper or fine pumice stone and cleaned of dust before the next coat is laid.

No left over paint shall be put back into the stock tins. When not in use, containers shall be kept properly closed.

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The final painted surface shall present a uniform appearance and no streaks, blisters hair marks from the brush or clogging of paint puddles in the corners of panels, angles of moldings etc shall be left on the work.

In case of cement based paints/primers, the absorbent surfaces shall be evenly damped so as to give even suction. In any weather, freshly painted surfaces shall be kept damp for atleast two days.

In painting doors and windows, the putty around the glass panes must also be painted, but care must be taken to see that no paint stains etc. are left on the glass. Tops of shutters and surfaces in similar hidden locations shall not be left out while painting. Perspect covers of electrical switch boxes have to be painted from inside by removing them. Care shall be taken while removing them in position after painting with respective approved paints. In painting steel work, special care shall be taken while painting over bolts, nuts, rivets, overlaps etc.

The additional specifications for primer and other paints shall be as in accordance to the detailed specifications under the respective headings.

Any damage caused during painting work to the existing works/surfaces shall be made good by the contractor at his own cost.

1.6. BRUSHES AND CONTAINERS :

After work, the brushes shall be completely cleaned off paint and linseed oil by rinsing with turpentine. A brush in which paint has ruined and shall on no account be used for painting work. The containers, when not in use, shall be closed, kept air tight and shall be kept at a place free from dust. When the paint has been used, the containers shall be washed with turpentine and wiped dry with soft clean cloth, so that they are clean and can be used again.

1.7. PRECAUTIONS

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All furnitures, lighting, fixtures, sanitary fittings, glazing floors etc shall be protected by covering and stains, smears, splashing, if any shall be removed and any damage done shall be made good by the contractor at his cost.

1.8. (A) PAINTING PRIMING COAT ON WOOD, IRON OR PLASTERED SURFACES :

1.8.1. Primer

1. The primer for wood work, iron work or plastered surface shall be as specified in the description of the item.
2. Primer for wood work/Iron & steel/Plastered/Aluminium surfaces shall be as specified below.

	Surfaces	Primer to be used
a.	Wood work (hard & soft wood)	Pink conforming to I S 3536 of latest version
b.	Resinous wood and ply wood	Aluminium primer
c.	Iron & steel , Aluminium and galvanised Steel work	Zinc chromate primer conforming to I S 104 of latest version
d.	Plastered surfaces	Primer as specified in the item.

3. The primer shall be ready mixed primer of approved brand and manufacture.

1.8.2. Preparation of surface.

- a) Wood work : The wood work to be painted shall be dry and free from moisture

The surface shall be thoroughly cleaned. All unevenness shall be rubbed down smooth with sand paper and shall be well dusted. Knots, if any, shall be covered with preparation of red lead made by grinding red lead in water and mixing with strong glue sized and used hot. Appropriate filler material with

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same shade as paint shall be used where so desired by the Engineer – in – charge.

The surface treated for knotting shall be dry before painting is applied. After the priming coat is applied, the holes and indentation on the surface shall be stopped with glaziers putty or wood putty (for specifications for glaziers putty and wood putty-refer as mentioned here-in-before). Stopping shall not be done before the priming coat is applied as the wood will absorb the oil in the stopping and the latter is therefore liable to crack.

- b) Iron and Steel Work : All rust and scales shall be removed by scrapping or by brushing with steel wire brushes. Hard skin of oxide formed on the surface of wrought iron during rolling which becomes loose by rusting, shall be removed

All dust and dirt shall be thoroughly wiped away from the surface.

If the surface is wet, it shall be dried before priming coat is undertaken.

- c) Plastered Surface : The surface shall ordinarily not be painted until it has dried completely. Trial patches of primer shall be laid at intervals and where drying is satisfactory, painting shall be taken in hand. Before primer is applied, holes and undulations, shall be filled up with plaster of paris and rubbed smooth.

1.8.3. Application: The primer shall be applied with brushes/rollers, worked well into the surface and spread even and smooth. The painting shall be done by crossing and laying off as described here-in-before.

1.8.4. Other Details : The specifications for Painting (General) in para 32.2 shall hold good so far it is applicable.

1.9. PAINTING WITH SYNTHETIC ENAMEL/SEMI GLOSSY PAINT ON NEW WORK:

1. Paint : Synthetic enamel/semi glossy paint of approved brand and manufacture and required shade shall be used for the top coat and an under

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coat of shade to match the top coat as recommended by the manufacturer shall be used. The paint shall be conforming to IS : 1932 of latest version

2. Preparation of surface : This shall be as per painting with superior quality ready mixed paint as mentioned here-in-before.
3. Application : The number of coats including the under coat shall be as stipulated in the item.
 - 3.1 Under coat : One coat of the specified paint of shade suited to the shade of the top coat shall be applied and allowed to dry over night. It shall be rubbed next day with the finest grade of wet abrasive paper to ensure a smooth and even surface free from brush marks and all loose particles shall be dusted off. All the cracks, crevices, roughness etc will be filled with approved putty as per manufacturers recommendations.
 - 3.2 Top Coat : Finishing coats of specified paint of the desired colour and shade shall be applied after the under coat is thoroughly dried. Additional finishing coats shall be applied if found necessary to ensure a proper and uniform semi glossy surface.
 - 3.3 Other details : The specifications for "Painting (General)" mentioned here-in-before shall hold good as far as they are applicable.

1.10. PAINTING WITH ACRYLIC EMULSION/PLASTIC EMULSION PAINT

1. This shall be polyvinyl based Acrylic/plastic emulsion paint of approved manufacture of the required shade, conforming to IS5411 of latest version.
2. Primer : The primer to be used for the painting with acrylic emulsion on cement concrete surfaces, plastered surfaces, A C sheets, timber and metal surfaces, if necessary, shall be of approved base as per recommendations of the manufacturers and as per relevant items of SOQR.
3. Finishing coats : All the finishing coats shall be of matt finish or any other Finish as required by the Engineer-in-charge. The number of finishing coats shall be as specified in the item.

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JOB REQUIREMENTS:

- i) Acrylic emulsion paint is required to be provided on plastered and concrete surfaces in portions of the building.
- ii) All shades and colours of paints shall be subjected to review and prior approval of engineer-in-charge shall be taken before the application.

1.11. MODE OF MEASUREMENT:

The painting items in supply category shall be measured in litres/kgs as per the painting material requirement and based on the invoice of materials received.

This item for application shall be measured in sqm. Correct to two places of decimal. Length and breadth shall be measured correct to 1 cm. All the measurements for payment shall be taken on net surface area actually painted, unless otherwise specified. Deduction will be made from the areas for fixtures, grills, ventilation, outlets, electrical boxes and such obstructions not painted, if they are individually more than 0.05 sqm. In general IS-1200 shall be referred for measurement purpose.

Table of co-efficients to be applied over areas of different surfaces to get equivalent plain areas are as per Part-15 of IS-1200 of latest edition.

Painting of rain water, soil, waste, vent and water pipes etc shall be measured in running metres of the particular diameter of the pipe concerned. Painting of specials such as bends, heads, branches, junctions, shoes etc shall be included in the length and no separate measurements shall be taken for these or for painting brackets, clamps etc

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Chapter – XIX

INDIAN WATER CLOSET

1.1 GENERAL

The item pertains for providing white or colour glazed vitreous chinaware Indian water closet of size and colour as specified in the schedule including fixing.

1.2 MATERIAL

Orissa Pattern IWC of specified colour and size with 'P' or 'S' trap with or without vent shall conform to IS 771 of latest version.

1.3 FIXING

The water closet pan shall be placed in position as shown in the drawing. The IWC shall be supported on brick masonry in CM 1:4 or as directed by the Engineer-in-charge. The pan shall be fixed slightly lower than the floor level. If the pan or trap is damaged during handling or fixing, it shall be replaced by the contractor at his own cost. The pan, trap and C.I. pipe shall be jointed in 1:1 Cement Mortar with hemp yarn caulked. The gap between W.C. and floor shall be finished with white / matching cement and sand as directed.

1.4 THE RATE INCLUDES FOR

1. Supplying and fixing specified colour glazed W.C.
2. Jointing in 1:1 cement mortar with hemp yarn caulked.
3. Cutting hole in wall / slab/ beam etc, wherever required and making good to original condition after fixing.
4. Providing supporting structure of brick masonry in CM 1:4.
5. Dewatering the pit if necessary, till completion of work.
6. Testing the entire system and rectification of defects if any.
7. All necessary labour, material and use of tools.

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1.5 MODE OF MEASUREMENT

The measurement shall be for each unit of W.C. fixing.

1.6 MODE OF PAYMENT

The contract rate shall be for each unit of W.C. pan fixed.

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Kudankulam Nuclear Power Project	Construction of 203 Nos of Residential Quarters comprising of 40 Nos of E-type (G+10 floor-1 Tower), 80 Nos of D-Special quarters (G+10 floor-2 Tower), 80 Nos of B-type quarters (G+10 floor-2 Tower) and 3 Nos of F Type quarters (G+1 floor) at Anuvijay Township
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Chapter - XX

EUROPEAN WATER CLOSET

1.1 GENERAL

The item pertains for providing white or colour glazed vitreous chinaware European water closet with seat and cover of size and colour as specified in the schedule including fixing.

1.2 MATERIAL

Chinaware European water closet with integrated "P" or "S" trap shall conform to IS 771 of latest version. Plastic seat and cover with C.P. pillar hinges and screws shall be of approved make and heavy quality.

1.3 FIXING

The water closet pan shall be placed in position as shown in the drawing. If the pan or trap is damaged during handling or fixing, it shall be replaced by contractor at his own cost. The pan, trap and PVC pipe shall be jointed in 1:1 Cement Mortar with hemp yarn caulked/solvent as applicable. The gap between W.C. and floor shall be finished with white/matching cement and sand as directed.

1.4 THE RATE INCLUDING FOR

1. Supplying and fixing specified colour glazed W.C.
2. Jointing in 1:1 cement mortar with hemp yarn caulked/solvent as applicable.
3. Cutting hole in wall / slab / beam etc, wherever required and making good to original condition after fixing.
4. Testing the entire system and rectification of defects if any.
5. Wash down EWC in white glazed vitreous chinaware with integral "P" of "S" trap with or without vent and jointing the trap with soil pipe in CM 1:1 with hemp yarn caulked/solvent as applicable

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6. All necessary labour and use of tools.

1.5 MODE OF MEASUREMENT

The measurement shall be for each unit of W.C. fixed.

1.6 MODE OF PAYMENT

The contract rate shall be for each unit of W.C. pan fixed.

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Kudankulam Nuclear Power Project	Construction of 203 Nos of Residential Quarters comprising of 40 Nos of E-type (G+10 floor-1 Tower), 80 Nos of D-Special quarters (G+10 floor-2 Tower), 80 Nos of B-type quarters (G+10 floor-2 Tower) and 3 Nos of F Type quarters (G+1 floor) at Anuvijay Township
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Chapter – XXI

WASH BASIN

1.1 GENERAL

The item pertains for providing coloured or white glazed vitreous chinaware wash basin of size and Colour as specified in the schedule/porcelain oval shape white colour counter sunk wash basin including fixing.

1.2 MATERIAL

China ware Wash Basin shall conform to IS 771 of latest version and shall be of standard pattern of approved quality and make/porcelain oval shape white colour counter sunk wash basin.

1.3 FIXING

The Wash Basin shall be fixed in position as indicated in the drawings/as per directed by Engineer-in-charge. The gap between Wash Basin and marble/wall shall be finished with polysulphade compound of approved quality. The Wash basin shall be fixed in the Marble slab by cutting into required shapes as required without any extra charges.

1.4 THE RATE INCLUDES FOR

1. Supplying and fixing specified colour glazed wash basin/ porcelain oval shape white colour counter sunk wash basin
2. Cutting hole in wall / slab / beam/marble etc. wherever required and making good to original condition after fixing.
3. All necessary materials, labour and used of tools.

1.5 MODE OF MEASUREMENT

The measurement shall be for each unit of wash basin fixed.

1.6 MODE OF PAYMENT

The contract rate shall be for each unit of wash basin fixed.

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Chapter – XXII

BOTTLE TRAP

1.1 GENERAL

The item pertains to provide PTMT bottle trap of self cleaning design including fixing.

1.2 MATERIAL

The bottle trap shall be of PTMT bottle trap of self cleaning design of heavy quality and of size as mentioned in the schedule. Wall flange and extension piece shall be of PTMT Symet in required length.

1.3 FIXING

Bottle trap shall be fixed to wash basin as indicated in the drawing with necessary specials or as ordered by the Engineer-in-charge. Jointing shall be done with solvent cement/tuflon tapes etc.

1.4 THE RATES INCLUDES FOR

1. Bottle trap with necessary specials.
2. All necessary labour, material and the use of tools.

1.5 MODE OF MEASUREMENT

The measurement shall be for each unit of bottle trap fixed.

1.6 MODE OF PAYMENT

The contract rate shall be for each fixed.

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Chapter – XXIII

BIB TAP AND STOP COCK

1.1 GENERAL

The item pertains to provide chromium plated brass bib tap or stop cock with CP Flange of heavy quality specials including fixing.

1.2 MATERIAL

The Bib tap and Stop cock shall be 15 mm nominal diameter or as specified in the schedule. It shall be of C.P brass approved and heavy quality and shall conform to I.S 781 of latest version.

1.3 FIXING

Bib tap or stop cock shall be fixed to the pipe line with C.P brass or composite specials, if required or as directed by Engineer-in-charge. Jointing shall be done with white zinc, spun yarn etc. A few turns of fine hemp yarn dipped in linseed oil shall be taken over the threaded ends to obtain compete water tightness. Leaky joint shall be remade to make it leak proof .

1.4 THE RATE INCLUDES FOR

1. Bib tap and Stop cock, specials etc.
2. All necessary labour, material and the use of tools.

1.5 MODE OF MEASUREMENT

The measurement shall be for each unit of bib tap or stop cock fixed.

1.6 MODE OF PAYMENT

The contract rate shall be for each unit of bib tap or stop cock fixed.

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Chapter – XXIV

GLASS MIRROR

1.1 GENERAL

The item includes providing bevelled or plain edges glass mirror with frame of size as mentioned in the schedule including fixing.

1.2 MATERIAL

Glass mirror shall be 6 mm thick glass of approved make with silvered polish and protective coat of copper sulphate. Backing shall be provided with PVC backing 4mm thick

1.3 FIXING

Glass mirror shall be fixing to proper line and level as indicated in drawing with 40 mm long C.P brass screws, wooden rawl plug, drilling hole and making good the wall to the original condition after fixing the glass mirror etc.

1.4 THE RATE INCLUDES FOR

1. Glass mirror with PVC backing 4mm thick, CP screws and C.P caps etc.
2. All necessary labour, material and the use of tools.

1.5 MODE OF MEASUREMENT

The measurement shall be for each unit of glass mirror as specified in the schedule.

1.6 MODE OF PAYMENT

The contract rate shall be for each unit of glass mirror as specified in the schedule.

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Chapter – XXV

TOWEL ROD

1.1 GENERAL

The item includes providing Tower rod of size as mentioned in the schedule including fixing.

1.2 MATERIAL

C.P brass Towel rod shall be of 20mm diameter and 600 mm long with C.P. brass brackets.

1.3 FIXING

The Towel rod shall be fixed to proper line and level as indicated in drawing with 40 mm long C P brass screws, wooden rawl plug, drilling hole etc. and making good the wall to original condition after fixing the towel rod.

1.4 THE RATE INCLUDES FOR

1. Towel rod with C.P brackets, C.P screws etc.
2. All necessary labour, material and the use of tools.

1.5 MODE OF MEASUREMENT

The measurement shall be for each unit of towel rod fixed.

1.6 MODE OF PAYMENT

The contract rate shall be for each unit of towel rod fixed.

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Chapter – XXVI

WASTE COUPLING

1.1 GENERAL

The item pertains to provide PTMP symet/CP brass waste coupling with rubber plug ball chain with necessary check nut including fixing.

1.2 MATERIAL

The wastage coupling shall be of PTMP symet/CP brass waste coupling of approved and heavy quality of size as mentioned in the schedule.

1.3 FIXING

Waste coupling shall be fixed to wash basin, sink or urinal as indicated in the drawing with necessary specials or as ordered by the Engineer-in-charge. Jointing shall be done with white zinc, spun yarn etc. A few turns of fine hemp yarn dipped in linseed oil shall be taken over the threaded ends to obtain complete water tightness. Leaky joint shall be remade to make it leak proof.

1.4 THE RATE INCLUDES FOR

1. Waste coupling with necessary specials.
2. All necessary labour, material and the use of tools.

1.5 MODE OF MEASUREMENT

The measurement shall be for each unit of waste coupling fixed.

1.6 MODE OF PAYMENT

The contract rate shall be for each unit of waste coupling fixed.

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Kudankulam Nuclear Power Project	Construction of 203 Nos of Residential Quarters comprising of 40 Nos of E-type (G+10 floor-1 Tower), 80 Nos of D-Special quarters (G+10 floor-2 Tower), 80 Nos of B-type quarters (G+10 floor-2 Tower) and 3 Nos of F Type quarters (G+1 floor) at Anuvijay Township
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Chapter – XXVII

FLUSHING CISTERN

1.1 GERERAL

The item pertains to provide white or colour PVC flushing cistern with all inside syphonic fittings including fixing.

1.2 MATERIAL

High level PVC flushing cistern with nylon pull thread and dual action low level PVC flushing cistern shall be of make colour and of capacity as specified in the schedule and shall conform to relevant IS code with ISI mark.

PVC/CP brass flush pipe with CP brass check nut and PVC over pipe with CP brass check nut of size and length shall be as specified in the schedule.

1.3 FIXING

The PVC flushing cistern shall be placed over a pair of PVC or aluminium brackets, if required or as recommended by the manufacturer PVC flush pipe of specified diameter shall be fixed to cistern and WC pan by using check out , white zinc, spun yarn, cement mortar etc.

The over flow pipe shall be left at 150 mm above the finished floor level. The concealed or exposed piping work for flush pipe and over flow pipe shall be carried out as per the relevant specification. All metallic parts shall be painted with two coats of flat oil paint over a coat of primer.

1.4 THE RATE INCLUDES FOR

1. Supplying and fixing flush tank, flush pipe and over flow pipe.
2. Painting all the metallic parts with two coats of flat oil paint over a coat of primer.

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3. Cutting hole in wall/slab/beam etc, wherever required and making good the same to original condition after fixing.
4. Cost of jointing materials such as Zinc, spun yarn, cement mortar 1:1: etc.
5. Testing the entire system and rectification of defects, if any.
6. All necessary materials labour and use of tools.

1.5 MODE OF MEASUREMENT

The measurement shall be for each unit of flushing cistern fixed as a whole.

1.6 MODE OF PAYMENT

The contract rate shall be for each unit of flushing cistern fixed as a whole.

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Chapter - XXVIII

PVC WATER INLET CONNECTION

1.1 GENERAL

The item pertains to provide colour or white PVC water inlet connection including fixing.

1.2 MATERIAL

PVC Water inlet connection shall conform to IS specifications and shall be of standard pattern of minimum 450 mm long to withstand temperature upto 60°C with heavy PVC check nut at both ends.

1.3 FIXING

The PVC water inlet connection shall be fixed in position as indicated in the drawing of as directed by the Engineer-in-charge.

1.4 THE RATE INCLUDES FOR

1. Supplying and fixing of PVC water inlet connection.
2. Cost of jointing materials.
3. All necessary labour, material and use of tools.

1.5 MODE OF MEASUREMENT

The measurement shall be for each unit of water inlet connection fixed.

1.6 MODE OF PAYMENT

Contract rate shall be for each unit of PVC water inlet connection fixed.

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Chapter – XXIX

SHOWER ROSE

1.1 GENERAL

The item pertains to provide CP Brass shower rose 15 mm x 50 mm easy clean type with ball and socket arrangement, with CP Brass shower arm of 300 mm length with flange with accessories including fixing.

1.2 FIXING

Shower rose shall be fixed to the pipe line with necessary socket, bend, union/nuts, nipple etc. as required or as ordered by Engineer-in-charge. Jointing shall be done with white zinc, spun yarn etc. A few turns of fine hemp yarn dipped in linseed oil shall be taken over the threaded ends to obtain complete water tightness. Leaky joint shall be remade to make it leak proof.

1.3 THE RATE INCLUDES FOR

1. Shower rose, bend, socket, union/nuts, nipple etc.
2. All necessary labour, material and the use of tools.

1.4 MODE OF MEASUREMENT

The measurement shall be for each unit of shower rose fixed.

1.5 MODE OF PAYMENT

The contract rate shall be for each unit of shower rose fixed.

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Chapter – XXX

SOAP DISH

1.1 GENERAL

The item includes providing CP Brass soap dish of size as mentioned in the schedule including fixing.

1.2 MATERIAL

The soap dish shall conform to the requirement of relevant IS Standards of latest version.

1.3 FIXING

Soap dish shall be fixed position as directed by the Engineer-in-charge with necessary fixtures such as screws etc.

1.4 MODE OF MEASUREMENT

The measurement shall for each unit of soap dish fixed.

1.5 MODE OF PAYMENT

Contract rate shall be for each unit of soap dish fixed.

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Chapter – XXXI

STAINLESS STEEL SINK

1.1 GENERAL:

Item includes providing the stainless steel sink of size as specified in the schedule including fixing.

1.2 MATERIAL:

The sink shall be of best quality stainless steel with or without drain board and size as specified in the schedule. The stainless steel sink shall be made out of 1.00 mm thick single sheet of high grade indestructible chrome nickal steel with mirror or mat finish.

1.3 FIXING:

The sink shall be fixed in position as indicated in the drawing. The sink shall be placed in the granite on the platform. Gap between sink and platform/ wall shall be filled with 1:2 cement mortar and finishing shall be done with white/matching colour cement, including finishing the bottom surfaces of the sink with cement mortar.

1.4 THE RATE INCLUDES FOR

1. S.S. sink, cement sand etc.
2. Placing/fixing the sink over the platform or brackets.
3. All necessary labour, material and use of tools.

1.5 MODE OF MEASUREMENT:

The measurement shall be for each unit of stainless steel sink fixed.

1.6 MODE OF PAYMENT:

Contract rate shall be for each unit of stainless steel sink fixed.

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Chapter – XXXII

PVC RAIN WATER DOWN PIPES

1.0 PVC RAIN WATER DOWN PIPES

1.1 GENERAL

The item includes supplying of PVC pipes with fittings of specified diameter including fixing in position at all elevations, cutting, jointing, etc for rain water down comer pipe line works including making masonry supports with a PVC shoe fixed 150 mm above ground/apron level of the building.

1.2 MATERIAL

The pipes and fittings shall conform to IS 13592-Type A, PVC pipes for rain water system and fittings shall be free from cracks, flaws and defects and shall be able to withstand a pressure as mentioned relevant IS standards. The dimensions of pipe, properties of pipe should confirm with the relevant IS standards.

1.3 EXAMINING

Before fixing the pipe line, it shall be first examined for damages and cracks. No cracked or damaged pipe and fittings shall be used in the work and they shall be removed from the site by the contractor at his own cost and charge.

1.4 CLEANING

All the pipes and fittings shall be thoroughly cleaned with brush and washed if necessary to remove any accumulated stone, soil or dirt inside and out side surfaces.

1.5 FIXING

The pipe line shall be fixed in position as shown in the drawing or as directed by the Engineer-in-charge. The pipe shall be fixed with G.I clamps not less than 2 mm thick or with suitable diameter PVC clamps. The clamps shall be fixed into the wall

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with screws not less than 40 mm long and wooden packing pieces at minimum every 1m spacing.

1.6 MAKING JOINT

The jointing of pipes and fittings generally shall be done with approved make cement solvent including making surface rough. The pipe shall be cut to desired length. Care shall be taken that profile or cut surfaces shall not be changed and the fibrous material shall be removed with scraper or knife.

1.7 TESTING

The joints shall be tested hydraulically to a pressure as specified in the schedule/as per relevant IS standards or as directed by the Engineer in charge. The leaky joints shall be remade and section re-tested at no extra cost.

1.8 THE RATE INCLUDES FOR

1. Supplying of PVC pipes and fittings such as Shoe, Grating of specified diameter.
2. Fixing in position and cutting the pipe wherever necessary and including wastage.
3. Fixing the pipe line with G.I. clamps not less than 2 mm thick and screws length not less than 40 mm or with PVC clamps, screws, wooden packing pieces etc.
4. Making the solution joints.
5. All necessary materials, labour and use of tools.

1.9 MODE OF MEASUREMENT

The measurement shall be for unit running metre length of pipe line fixed. The measurement shall be taken along the longitudinal axis center to center. No measurement shall be recorded separately for fittings, making, joint and testing.

1.10 MODE OF PAYMENT

The contract rate shall be for unit running metre length of pipe line fixed.

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Kudankulam Nuclear Power Project	Construction of 203 Nos of Residential Quarters comprising of 40 Nos of E-type (G+10 floor-1 Tower), 80 Nos of D-Special quarters (G+10 floor-2 Tower), 80 Nos of B-type quarters (G+10 floor-2 Tower) and 3 Nos of F Type quarters (G+1 floor) at Anuvijay Township
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Chapter – XXXIII

PVC PIPING WORK FOR SEWER LINES

1.1 GENERAL

The item includes supplying of PVC pipes with fittings of specified diameter including laying under floors, fixing in position at all elevations, cutting, jointing, etc for Soil pipe line, waste water pipe line, vent, over flow, etc.

1.2 MATERIAL

The pipes and fittings shall conform to IS 13592-Type B PVC pipes for soil, waste, vent or antisiphonage pipes for Soil and waste discharge system for inside and outside the buildings. Under floors drainage and sewerage system pipes shall confirm to IS 15328 for soil, waste pipes and fittings shall be free from cracks, flaws and defects and shall be able to withstand a pressure as mentioned relevant IS standards. The dimensions of pipe, properties of pipe should confirm with the relevant IS standards.

1.3 EXAMINING

Before laying/fixing the pipe line, it shall be first examined for damages and cracks. No cracked or damaged pipe and fittings shall be used in the work and they shall be removed from the site by the contractor at his own cost and charge.

1.4 CLEANING

All the pipes and fittings shall be thoroughly cleaned with brush and washed if necessary to remove any accumulated stone, soil or dirt inside and out side surfaces.

1.5 LAYING

The pipes shall be carefully laid straight to the correct alignment in gradients as indicated in the drawing. All the pipe shall be used in standard length as far as

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possible. Cut length may be used only where it is necessary to make up exact length.

The entire length of pipe shall be evenly supported on bed of the trench through out. Care shall be taken to prevent any sand, earth or other materials from entering into the pipes during laying. At the end of day's work the open end shall be suitably plugged.

1.6 FIXING

The pipe line shall be fixed in position as shown in the drawing or as directed by the Engineer-in-charge. The pipe shall be fixed with G.I clamps not less than 2 mm thick or with suitable diameter PVC clamps. The clamps shall be fixed into the wall with screws not less than 40 mm long and wooden packing pieces at minimum every 1m spacing or as directed.

1.7 MAKING JOINT

The jointing of pipes and fittings generally shall be done with approved make cement solvent including making surface rough. The pipe shall be cut to desired length. Care shall be taken that profile or cut surfaces shall not be changed and the fibrous material shall be removed with scraper or knife.

1.8 DETACHABLE JOINT

Detachable joints shall be made where pipes of different materials have to be jointed or as specified in the schedule. The flanges are first pushed over the pipe ends and jointing shall be made by cement solvent.

1.9 DEWATERING

The contract rate shall include bailing or pumping out all the water till completion of work if accumulated during the progress of work either from seepage, springs, raining or any other cause.

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1.10 TESTING

The joints shall be tested hydraulically to a pressure as specified in the schedule/as per relevant IS standards or as directed by the Engineer in charge. The leaky joints shall be remade and section re-tested at no extra cost.

1.11 THE RATE INCLUDES FOR

1. Supplying of PVC pipes and fittings of specified diameter.
2. Laying, fixing in position and cutting the pipe wherever necessary and including wastage.
3. Fixing the pipe line with G.I. clamps not less than 2 mm thick and screws length not less than 40 mm or with PVC clamps, screws, finished wooden packing pieces etc.
4. Making the solution joints.
5. Dewatering if necessary till completion of work.
6. All necessary materials, labour and use of tools.

1.12 MODE OF MEASUREMENT

The measurement shall be for unit running metre length of pipe line laid or fixed. The measurement shall be taken along the longitudinal axis center to center. No measurement shall be recorded separately for fittings, making, joint and testing.

1.13 MODE OF PAYMENT

The contract rate shall be for unit running metre length of pipe line laid or fixed.

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Chapter – XXXIV

POLYETHYLENE COMPOSITE PRESSURE PIPE

1.0 GENERAL

The item includes supplying of Polyethylene/Aluminum/Polyethylene Composite pressure pipe(PE-AL-PE) with fittings of specified diameter including laying, fixing, cutting, jointing.

These pipes shall be provided for internal and external (Inside shaft area, above ground and underground loop line) water supply system.

2.0 MATERIAL

The pipes and fittings shall conform to IS-15450 of latest version Or IAPMO standards PE-AL-PE pipes and fittings shall be free from cracks flaws and defects and shall be able to withstand pressure as per IS15450 of latest version.

Multilayer composite pipe shall have welded aluminium tube bonded in between two layers of polyethylene by two layers of adhesive layer. Outer layer shall be U.V. stabilized with carbon black.

Polyethylene-Aluminium-Polyethylene (PE-AL-PE) Composite plumbing pipes for Hot & Cold-water supply manufactured as per IAPMO IGC-India 308 – 2014. Composite Pipes per IAPMO IGC – India 308 have a pressure rating of 12 Kg/cm² at 23°C temperature, 6 Kg/cm² at 65°C. Design life span for Composite Pipes is in excess of 50 Years.

For ease of identification a blue longitudinal strip to be provided through out the length of the pipe on the outer black surface.

The pipe shall be marked with permanent laser marking at intervals not greater than 1 meter with meter counter reading, nominal pipe size, manufacturer's name or trade mark, material designation "PE-AL-PE", intended service "Plumbing", maximum rated working pressure at 23°C and 65°C, IAPMO – IGC-India 308, Date and Time of manufacture and the UPC-I & the UMC-I certification mark.

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3.0 EXAMINIG

Before laying the pipe line it shall be first examined for damages and cracks. No cracked or damaged pipe and fittings shall be used in the work and they shall be removed from the site by the contractor at his own cost and charge.

4.0 CLEANING

The internal & external surfaces of the pipe shall be smooth, clean and free from grooving and other defects. The ends shall be cleanly cut and shall be square with the axis of the pipes. .

5.0 LAYING

The pipes shall be carefully laid straight to the correct alignment in gradients as indicated in the drawing. All the pipe shall be used in standard length as far as possible.

6.0 FIXING

The pipe line shall be fixed in position as shown in the drawing or as directed by the Engineer –in-charge. For Concealed works, the pipes shall be embedded in the walls by chasing the walls making recess, suitably to receive the pipes and fixing in position and finishing smooth the concealed area with Cement mortar 1:3 or as directed. (The cost for embedding cutting, finishing works is borne by the contractor). The concealed pipe should not protrude outside the brick wall alignment, it should be concealed minimum 1cm inner of the brick wall or as directed. For External works, the pipes should be laid to true plump, verticality etc and fixing with Box clamps/GI clamps of approved make with screws at every 1m interval or as directed. Whenever the pipes are laid in bending areas, composite fittings are to be used and direct bending of pipeline to lay in position is not permitted. Maximum fittings to be utilized for fixing and serviceability requirements as directed by Engineer-in-charge. Plumbing Drawings will be issued before start of work and contractor has to make in-house drawings for installation of pipe and sample flat to be installed with pipe/required fittings etc and approval to be

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obtained from Engineer-in-charge for pipe installation and further commencing of work.

7.0 TESTING

The joints shall be tested hydraulically to a pressure as per IS-15450 of latest version. The leaky joints shall be remade and section re-tested without any extra cost. Following tests to be conducted/reports to be submitted during material approval of PE-AL=PE pipe by the contractor on his own cost

A. Burst Pressure Test: The pipe when subjected to internal pressure shall not burst at or below the pressure as specified in following table. The total time for pressurization shall not exceed 1 minute:

Nominal pipe size	Minimum Burst Pressure
ID OD	KG/CM ²
1014	70.00
1216	60.00
1620	50.00
2025	40.00
2532	40.00
3240	35.00
4050	35.00

B. Hydraulic Pressure Test: The pipe when subjected to internal pressure at 20°C for 1 hour or at 60°C for 10 hours shall not burst or fail. The test pressures for the tests are as specified in following table.

Nominal pipe size	Sustained Pressure (KG/CM ²)	
ID OD	At 20°C	At 60°C
1014	30.00	25.00
1216	30.00	25.00

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1620	27.00	25.00
2025	26.00	25.00
2532	23.00	21.00
3240	22.00	20.00
4050	21.00	19.00

TYPE TEST:

The pipe should pass Hydrostatic creep test when tested as per 11.1 of IS 15450 : 2004. The pipe shall withstand the test pressure as given below for 170 Hours without any failure at 95°C.

Nominal pipe size	Test Pressure
ID OD	KG/CM ²
1014	13.00
1216	12.00
1620	10.00
2025	10.00
2532	9.00
3240	9.00
4050	8.00

ASSOCIATED FITTINGS

Fittings are of internal sealing type with dual sealing ring of silicon rubber capable to provide perfect air tight / water tight joint.

Composite Fittings

Fittings broadly made up of engineering plastics are called as composite fittings. Fittings of size 1216, 1620 and 2025 are made up of Engineering Plastics with DZR Brass inserts. ½" Female Threads of fittings are also to be manufactured with brass threaded inserts.

Brass Fittings

Fittings are broadly made up of Brass. Material coming into contact with flowing medium are of DZR Brass. These fittings are suitable for all applications, except in-compatible chemicals.

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TESTING

The fittings when tested alone or in assembly with composite pipe shall comply with the requirement as follows:

TYPE TEST:

The fittings should pass internal pressure creep test at 80°C to ensure basic strength of fittings with following test parameters and necessary test certificate shall be submitted by the manufacturer, if desired.

Nominal pipe size (ID:OD)	Test Pressure (KG/CM ²)	Test Duration (Hours)
10:14	12	50
12:16	12	50
16:20	10	50
20:25	10	50
25:32	09	50
32:40	09	50
40:50	09	50

INTERNAL PRESSURE TEST:

The fitting when assembled with composite pipe as per the manufacturer's recommended procedure, shall not fail or weep, at the test pressure (at ambient temperature) for one hour as given in the following table. The joint shall not have any leakage during the test.

Nominal pipe size	Test Pressure
ID:OD	KG/CM ²
10:14	36.00
12:16	34.30
16:20	26.70
20:25	26.70
25:32	23.00

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32:40	22.30
40:50	20.40

JOINT PULL OUT TEST

The fitting when assembled with composite pipe as per the manufacturer's recommended procedure and the joint of pipe and fitting shall pass the joint pull out test at ambient temperature for one hour when pulled with following test load.

Nominal pipe size	Test Load
ID:OD	Newton
10:14	620
12:16	740
16:20	1068
20:25	1640
25:32	2427
32:40	3694
40:50	5463

8.0 QUALIFICATION PROCEDURE FOR COMPOSITE PIPES AND FITTINGS

The contractor should obtain material approval from NPCIL, before start of the subject work. The material approval shall be as per IS-15450 of latest version. Following check list to be filled and submitted for approval along with required certificates/reports/testimonials from the Manufactures etc.

Check list for PE-AL-PE pipes as per IS-15450-2022

SI No	Description of Check as per IS-15450	Reference	Compliance report by Supplier
1.	Reports for Polyethylene Compounds used for the manufacture of the pipes conform to IS-7328 for PEEWA 45T006 for black pipes	Clause No:4.2	
2.	Reports for Percentage of UV stabilizer used shall not be more than 0.50% by	Clause No:4.3	

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SI No	Description of Check as per IS-15450	Reference	Compliance report by Supplier
	mass of finished resin (Certification of the same from Raw material supplier to be submitted)		
3.	Aluminium used for the pipe should meet the following: with reports	Clause No:4.4	
3.1	Minimum Elongation: 20%	Clause No:4.4	
3.2	Ultimate Tensile Strength: 100 Mpa	Clause No:4.4	
3.3	Nominal Aluminium thickness and tolerances	Clause No:4.4	
3.3.1	Nominal pipe size : 0912mm : 0.20	Clause No:4.4	
3.3.2	Nominal pipe size : 1014mm : 0.20	Clause No:4.4	
3.3.3	Nominal pipe size : 1216mm : 0.20	Clause No:4.4	
3.3.4	Nominal pipe size : 1620mm : 0.25	Clause No:4.4	
3.3.5	Nominal pipe size : 2025mm : 0.25	Clause No:4.4	
3.3.6	Nominal pipe size : 2532mm : 0.30	Clause No:4.4	
3.3.7	Nominal pipe size : 3240mm : 0.30	Clause No:4.4	
3.3.8	Nominal pipe size : 4050mm : 0.30	Clause No:4.4	
4	Reports for Pressure Rating for pipe: Maximum water pressure of 1.38 Mpa at 23°C and 1.10 Mpa at 60°C	Clause No:5	
5	Internal Test pressure with fittings and connectors for the following with reports	Annex-A (2.2)	
5.1	Size 1014: Test pressure-36 & Duration-1 hour	Annex-A (2.2)	
5.2	Size 1216: Test pressure-34.3 & Duration-1 our	Annex-A (2.2)	
5.3	Size 1620: Test pressure-26.7 & Duration-1 hour	Annex-A (2.2)	
5.4	Size 2025: Test pressure-26.7 & Duration-1 hour	Annex-A (2.2)	
5.5	Size 2532: Test pressure-23 &	Annex-A (2.2)	

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SI No	Description of Check as per IS-15450	Reference	Compliance report by Supplier
	Duration-1 hour		
5.6	Size 3240: Test pressure-22.3 & Duration-1 hour	Annex-A (2.2)	
5.7	Size 4050: Test pressure-20.4 & Duration-1 hour	Annex-A (2.2)	
5.8	Submission of reports for test pressure and duration for pull out test as per Table-10 of Annex-A	Annex-A (2.3.3)	
6	Colour of pipe shall be carbon black manufactured from compound grade PEEWA 45T006 (Certification of the same from Raw material supplier to be submitted)	Clause No:7	
7	Submission of reports as per Table-2 and Annex-B for pipe diameter, out-of roundness, total wall thickness and thickness of outer PE layer	Clause No:8	
8	Submission of reports for PE compound characteristics as per Table-3	Clause No: 10.1 , 10.2, 10.3 & 11.1.3	
9	Submission of reports for pigment dispensation as per Annex-C	Clause No:10.4	
10	Submission of reports for Adhesion test per Annex-D	Clause No:10.5	
11	Submission of reports for Apparent tensile strength of pipe test as per Annex-E & Table-4	Clause No:10.6	
12	Submission of reports for Minimum burst pressure as test per Annex-F & Table-4	Clause No:10.7	
13	Submission of reports for Hydraulic Characteristics test as per Annex-G & Table-5	Clause No:10.8	

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SI No	Description of Check as per IS-15450	Reference	Compliance report by Supplier
14	Submission of reports for Long term hydrostatic test as per Annex-G & Table-6	Clause No:11.1.1	
15	Submission of reports for Overall migration test as per IS 9845	Clause No:11.1.2	
16	Submission of reports for Thermal stability to oxidation test as per Annex-H & Table -3	Clause No:11.1.3	
17	Ensuring the 3 years validity for all test reports	Clause No:11.1.6	
18	Checking of Markings in Sample submitted for all diameters (Visual Inspection)	Clause No:12	
18.1	The marking shall be repeated at intervals of 1m and shall consist of the following	Clause No:12.1	
a	Manufacturer's name and trade mark		
b	Designation		
c	Batch or Lot number		
18.2	Two labels of suitable dimensions should be carefully attached to each coil indicating the following.	Clause No:12.2	
a	Supplier name		
b	Manufacturing standard		
c	Designation		
d	Weight of coil in kg and length of coil in meters		
18.3	BIS Certification marking	Clause No:12.3	
a	Each pipe may also be marked with the standard mark	Clause No:12.3.1	

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SI No	Description of Check as per IS-15450	Reference	Compliance report by Supplier
19	Report for Polyethylene Compounds – HDPE – Melt flow index	IS-7328	
20	Report for Density of HDPE	IS-7328	
21	Report for Antioxidant Content in HDPE	IS-7328	
22	Report for Aluminium Strip Dimension	IS-737	
23	Report for Aluminium Strip Ultimate tensile strength	IS-737	
24	Report for Aluminium Strip Elongation	IS-737	
25	Report for Adhesive Melt flow rate	IS-7328	

Following points may also to be adhered during approval of Materials:

1. The contractor shall submit the manufacturer's certificate confirming that the manufacturer of PE – AL – PE PIPES has minimum 10 years experience in the manufacture of multilayer (PE – AL –PE) composite pipes in India.
2. The contractor should confirm that the manufacturer has the in house quality control facilities for testing the PE-AL-PE pipes and fittings. A note on quality control procedure by the manufacturer to be submitted.
3. PE-AL-PE pipes and fittings has to be supplied/purchased from Single Manufacturer only and multiple manufacturers for piping and fittings are not permitted
4. The Contractor shall submit the copy of the valid ISI license of the manufacturer. The contractor will also submit the copy of registration certificate with Quality Assurance Department with DGS&D, Government of India.
5. The contractor shall also submit the samples of pipes and fittings for approval and shall supply the materials manufactured by such preapproved manufacturers.
6. The contractor shall also obtain an undertaking from the manufacturer for free access to the manufacturing facility and quality control facility.

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7. A note on site testing procedure from the manufacturer should also be submitted along with the tender.
8. A note on installation guidelines from the manufacturer shall be submitted.
9. The contractor should give the details of annual production capacity of the Manufacturer along with the list of plant and machinery installed in the manufacturing plant.
10. Manufacturer should have at least 20 years of experience in the manufacturing of Multilayer (PE-AL-PE) composite pipe.
11. The Quality Control laboratory of the Manufacturer should be well equipped to carry out all the acceptance tests specified in IS-15450 standards and as well as IPMO-IGC-INDIA 308-2014 standards.
12. The manufacturer of pipes and Fittings must have ISO-9001-2015 certification for its quality system.
13. If deemed necessary, Third Party Test Reports shall be submitted based on request of NPCIL on contractors scope.
14. The Manufacturer's R&D lab must be recognized as in house R&D unit by the Department of Science and Industrial Research, Govt. of India, Ministry of Science and Technology.

9.0 THE RATE INCLUDES FOR

1. Supplying of PE-AL-PE pipes and fittings of specified diameter including wastage.
2. Laying and cutting the pipe wherever necessary.
3. Concealing the pipe line as per drawings and finishing smooth the concealed area with Cement mortar 1:3 or as directed (Including cost of chipping/finishing the area etc)
4. Fixing the External pipe line with box clamps with screw.
5. All necessary labour, materials and use of tools and scaffolding charges.

10.0 MODE OF MEASUREMENT

The measurement shall be for unit running metre length of pipe line laid or fixed. The measurement shall be taken along the longitudinal axis center to center. No

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measurement shall be recorded separately for any fittings, making joint and testing.

11.0 MODE OF PAYMENT

The contract rate shall be for unit running metre length of pipe line laid or fixed.

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Chapter – XXXV

PVC NAHANI TRAP

1.1 GENERAL:

The item includes supplying of PVC Nahani trap (Single/Multi) of specified diameter with fittings and fixtures including fixing, cutting, jointing with the pipe line.

1.2 MATERIAL:

PVC Nahani trap of self cleaning design with 75 mm dia outlet shall conform to relevant IS of approved make as per BOQ. Top grating shall be of C.P.brass or Stainless steel of heavy quality and size and shape to suit the trap.

1.3 FIXING:

PVC Nahani trap with the bend and pipe piece shall be fixed in 100mm thick 1:2:4 cement concrete in position. The gap between trap and pipe shall be caulked with 1:1 cement mortar and the grating shall be fixed over the nahani/floor trap flush the floor level and the joints finished with matching cement.

1.4 THE RATE INCLUDES FOR

1. PVC Nahani trap with CP Brass or stainless steel grating.
2. Fixing the trap and grating with cement mortar or concrete.
3. Connecting the trap to the waste pipe, forming circular hole upto floor level and rendering smooth etc
4. All necessary materials, labour and use of tools.

1.5 MODE OF MEASUREMENT:

The measurement shall be for each unit of Nahani trap fixed.

1.6 MODE OF PAYMENT:

The Contractor rate shall be for each unit of nahani trap fixed.

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Chapter – XXXVI

GULLY TRAP

1.1 GENERAL

The item includes provision of PVC Gully trap with CI frame including construction of Gully Trap Chamber.

1.2 MATERIAL

The Gully Trap shall be best quality of PVC with 150 mm nominal dia inlet or as specified in the schedules with 100mm diameter outlet. Brick work, plastering, concreting shall be as per general specifications of section V.

1.3 CONSTRUCTION

1. Internal dimension of the Gully trap chamber shall be as specified in the schedule.
2. Foundation of 1:4:8 concrete shall be 100 mm thick and shall have 100 mm offset.
3. Brick masonry shall be of 110 mm thick in cement mortar 1:6 and masonry shall be plastered with 20 mm thick plaster in cement mortar inside and outside with smooth finish.

1.4 CI FRAME AND COVER

CI frame and cover shall be fixed with the cement concrete 1:2:4 at the top of chamber. The weight of frame and cover shall not be less than 7.0 kg and they shall be painted with two coats of black bitu mastic paint.

1.5 DEWATERING

The contract rate shall include bailing or pumping of all the water till completion of work if accumulated during the progress of work either from seepage, springs rain or any other cause.

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1.6 THE RATE INCLUDES FOR

1. Supplying of PVC gully trap with CI frame and cover.
2. PCC Concreting, brick work, plastering, Concrete for fixing frames and cover and also mentioned in the items as mentioned in the Schedule.
3. Dewatering if necessary till completion of work.
4. All necessary materials, labour and use of tools.

1.7 MODE OF MEASUREMENT

The measurement shall be for unit of each Gully Trap Chamber of specified internal size and depth constructed including PVC Gully Trap and CI frame and cover fixed.

1.8 MODE OF PAYMENT

The contract rate shall be for unit of each Gully Trap Chamber constructed as a whole.

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Chapter – XXXVII

INSPECTION CHAMBER

1.1 GENERAL:

The item includes provision of Inspection Chamber of brick masonry of internal size and works as specified in the schedule.

1.2 MATERIAL:

Concreting, Brick work, plastering etc. shall be as per specification as given in general specification as given.

1.3 CONSTRUCTION

1. Internal dimensions and initial depth shall be as specified in the schedule or as shown in the drawing.
2. Foundation of 1:4:8 concrete shall be 150 mm thick and shall have 150 mm offset.
3. The concrete 1:2:4 shall be laid to necessary shapes to form the channel for the pipe being received in the channel. It shall be of appropriate diameter and shall be half round. The sides shall be kept sloping towards the channel along the direction towards the PVC pipe lines.
4. Brick masonry in 230mm thick shall be in cement mortar 1:6
5. Brick masonry shall be plastered with 1:4 cement mortar for a minimum thickness of 20mm, inside and outside surfaces in two courses and inside surface finished smooth with neat cement punning.
6. providing and fixing C.I. steps weighing not less than 3.5 Kg/each at 300 mm centre to centre etc if necessary

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7. Top covered with 100mm thick RCC M20 grade slab, including providing & fixing double seal C.I. manhole covers & frames of required sizes and weights as mentioned in the Schedule and embedding the C.I. frame in RCC cover slab.

1.4 DEWATERING:

The concrete rate shall include bailing or pumping out all the water if accumulated during the progress of the work either from rain, seepage, springs or any other cause.

1.5 THE RATE INCLUDES FOR

- 1 Internal dimensions and initial depth shall be as specified in the schedule or as shown in the drawing.
- 2 Foundation of 1:4:8 concrete shall be 150 mm thick and shall have 150 mm offset.
- 3 The concrete 1:2:4 shall be laid to necessary shapes to form the channel for the pipe being received in the channel. It shall be of appropriate diameter and shall be half round. The sides shall be kept sloping towards the channel along the direction towards the PVC pipe lines.
- 4 Brick masonry in 230mm thick shall be in cement mortar 1:6
- 5 Brick masonry shall be plastered with 1:4 cement mortar for a minimum thickness of 20mm, inside and outside surfaces in two courses and inside surface finished smooth with neat cement punning.
- 6 Providing and fixing C.I. steps weighing not less than 3.5 Kg/each at 300 mm centre to centre etc.
- 7 Top covered with 100mm thick RCC M20 grade slab, including providing & fixing double seal C.I. manhole covers & frames of required sizes and weights as mentioned in the Schedule and embedding the C.I. frame in RCC cover slab.

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9. Dewatering the pit if found necessary till completion of work.

10. All necessary labour, materials and use of tools.

7.1 MODE OF MEASUREMENT:

The measurement shall be for each Inspection chamber of specified internal size and depth as specified in the Schedule.

7.2 MODE OF PAYMENT:

The contract rate shall be for each Inspection chamber of specified internal size and depth.

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Kudankulam Nuclear Power Project	Construction of 203 Nos of Residential Quarters comprising of 40 Nos of E-type (G+10 floor-1 Tower), 80 Nos of D-Special quarters (G+10 floor-2 Tower), 80 Nos of B-type quarters (G+10 floor-2 Tower) and 3 Nos of F Type quarters (G+1 floor) at Anuvijay Township
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Chapter – XXXVII

ELEVATORS

1.0 SCOPE OF WORK

These specifications cover the details of passenger lifts (08 passenger capacity), and Equipment cum passenger lifts (15/16 passenger capacity) to be designed supplied, inspection as may be necessary before dispatch, delivery at site, installation, testing, commissioning and maintenance for three year and handing over to client.

2.0 GENERAL

The equipment and installation covered by these specifications shall conform to codes of practice in force and highest standards of workmanship and material. This work shall be done in accordance with the provisions of the Local Lifts Authority rules and shall also conform to requirements of local municipal by laws, and subsequent provisions, as also any state or local Act in force and latest Indian Standard IS 17900 Part-I & Part-II and all latest applicable BIS Codes, NBC 2016 as amended up to date having provision for barrier free access as per Harmonized Guidelines & Standards for Universal Accessibility in India - 2021 of MoHUA & 'CPWD General Specifications for Electrical Works (Part III, Lifts & Escalators) 2003.

The Entire electrical installation shall be done in accordance with the Indian Electricity Act 2003, Indian Electricity Rules 1956 amended to-date. The Electrical wiring shall strictly comply with IS 732:2019 and latest applicable BIS and NBC-2016 code. The electrical works shall also confirm to CPWD General Specification for Electrical Work Part-1 (Internal) 2023 and Part-11 (External) 2023 as amended up to date.

The Contractor shall follow all Statutory Requirements as well as best trade practices in the manufacture & installation of lifts. The Contractor shall arrange the statutory approval of the Inspectorate of lifts as may be required for commissioning of the lifts and handover for operation after satisfactory tests.

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3.0 DRAWINGS

Before commencing work, the Contractor shall prepare and submit all drawings for individual lifts in required no's, necessary to show the general arrangement and details of lift installation, electrical etc. These drawings must be approved by Engineer in charge before installation and shall become part of the contract.

The Contractor shall, submit 4 copies of all working drawings showing pit, hoist way and machine room layouts clearly indicating and specifying all connected structural, electrical and civil works including imposed structural static / dynamic loads (including breaking load on guides, reaction of buffers on lift pits, reaction on support points in machine room, lift well etc.) and electrical ratings including calculations for selection of KW rating of motor. The Contractor shall obtain from the Engineer in charge all the information he needs to prepare his drawings and shall have any interaction with the technical consultants to finalize all parameters and data for design. The Contractor will be responsible for any discrepancies, errors and omissions in the drawings or particulars submitted by him even if these have been approved by the consultant/Project Engineer. On approval of these drawings, the Contractor shall submit 8(eight) copies of approved working drawings incorporating corrections / comments, if any, and shall immediately commence work.

On completion of work, the contractor shall supply two sets of pen drive and 8 copies of the detailed wiring diagram, 'As built' drawings and equipment operation & maintenance

Manuals and original certificates from 'Inspector of Lifts' for all the lifts. Further, a copy of such detailed diagram and a set of instructions for evacuation of passengers in case of breakdown of the lifts shall be framed and installed in the respective machine room by the Contractor.

The Contractor shall carry out all the work strictly in accordance with drawings, details and instructions of the Engineer in charge.

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4.0 WORKS TO BE ARRANGED BY CIVIL CONTRACTOR

The following items shall be provided to the Lift Contractor under instructions of the Project Engineer to suit the requirements of the lift Contractor.

- i. Hoist ways and pits of specified dimensions (within normal building tolerances).
- ii. Floor, wall and ceiling finishes in hoist ways, and pits including painting (except painting of equipment and materials supplied by lift Contractor) and waterproofing, as well as doors and windows in machine room.
- iii. Cables from main L.T. Panel Board through the hoist ways terminating in and including individual Main Switches of required rating for 3 phase and single phase supply including necessary earthing.
- iv. Free 3 phase power supply for group testing and commissioning of lifts after erection is completed.
- v. The equipment shall be suitable to operate on 415 Volts 3 phase, 4 wires, 50 Hz. A.C. supply with a variation of $\pm 10\%$ in Volts and $\pm 5\%$ in frequency respectively. The supply for illumination and single phase equipment shall be 230 Volts A.C.

5.0 LIFTS CONTRACTOR'S RESPONSIBILITIES: ANCILLARY WORKS

- i. All cabling, wiring and earthing from 3- phase main DB in machine room to Lift Contractor's equipment.
- ii. All steel items i.e. machine beam/bases, pedestals/bearing plate separators wherever required and buffer support channels, and structural steel supports and brackets for the installation in etc., to suit the sizes of the hoist ways.
- iii. Sill tracks including sill supports, supporting protection at all landings.
- iv. Screen guards, fascia plates and other protection for installation.
- v. To carry out minor civil work, such as chipping & making openings in slabs, grouting of foundation bolts in shaft, and pit modification and making rail bracket, hall buttons indicators and laying of sill in positions. Or any other work required for smooth operation/ commissioning of lifts. All chiseling and cutting of pockets and making good. (All cutting shall be as approved by EIC).
- vi. Ensuring safety against accidents including barricading all openings and caution signs.

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- vii. Scaffolding and other Tools & Tackles required for installation in the hoist way required for erection of lifts.
- viii. All other items necessary for satisfactory execution & completion of works, whether specified or not.
- ix. Power shall be provided at incoming of main DB for lifts. Main DB shall be provided by the lift contractor. From main DB to lifts, cables shall be in the scope of lift contractor.
- x. Trap doors, floor gratings, steps / ladders and openings in machine rooms and ladders for pits as required by the lifts Contractor. Contractor shall furnish the details of these items in the layout drawing for lifts to submit after award of the job.
- xi. Temporary power supply connection(s) for erection work shall be arranged by the lift Contractor.

6.0 SOUND REDUCTION

The Contractor shall provide necessary sound reduction materials, such as rubber pads/ anti vibration pads of proper density to effectively isolate the machine from the machine beams and/or flooring.

Noise level inside cars shall be maintained at minimum levels as laid down in the relevant codes and in any case not more than specified under PERFORMANCE PARAMETERS.

7.0 TRACTION MACHINE

The machine shall be worm geared traction type with motor (steel worm, bronze gears, steel sheave shaft & Ferro molybdenum sheave), electro- mechanical type of brake and driving sheave mounted in proper alignment on a single heavy case iron base or steel bedplate.

The worm shaft shall be fitted with roller bearings to take end thrust. The sheave shaft shall also be fitted with roller bearing s to ensure proper alignment. All shafts shall be provided with well-designed keys.

Rotating part shall be statically and dynamically balanced.

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The drive sheave shall be designed with machined V-grooves to ensure adequate traction with minimum wear on rope. All sheaves including deflector sheaves, where used, shall confirm to IS 17900

Adequate and dust – proof lubrication shall be provided for all bearings and worm gears.

The brake shall be suitably curved and provided with fire proof friction lining. The operation of brake shall be smooth, gradual and with minimum noise. The brake shall be designed to be of adequate size and strength to stop and hold the car at rest with rated load. The brake shall be capable of operation automatically by various safety devices, current failure and by the normal stopping of the car. The brake shall be released electrically. It shall also be possible to release the brake manually so as to move the lift car in short stops. After discussion with project engineer, suitable Brake release tools shall be supplied.

For manual operation of lifts , up & down direction of the movement of the car shall be clearly marked on the motor or traction machine . A warning plate in bold signal red colour to switch off the mains supply before releasing the brake and operating the wheel shall be prominently displayed.

8.0 HOIST MOTOR

The motor shall be suitable for 415 Volts +10% to -20%, 50Hz, $\pm 5\%$, 3 phase A.C. Supply. The motor must be designed for arduous lift duty, rapid reversals and constantly repeated starts & stops as defined in the relevant codes of practice. All windings must be heavily insulated, adequately impregnated for tropical climate and mechanically strengthened and must be specifically designed to have a high starting torque and low starting current characteristics within the limits acceptable to electricity supply co requirements and I.E. Rules. The motor shall be designed in such a way as to withstand occasional overloading above its rated capacity and shall have overload protection. The motor shall have good speed regulation under different conditions of load and shall be designed to give a noiseless and vibration-free operation. Insulation shall be class F.

9.0 MOTOR CONTROL AND DRIVE

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The lift motor shall be controlled by a variable voltage variable frequency (V.V.V.F) micro-processor control system which shall control and monitor every aspect of lift operation at all stages of the car motion cycle on real time basis.

The A.C.V.V.V.F. drive system shall control A.C. voltage and frequency concurrently with the hoist motor to regulate the lift's actual performance to match closely the ideal speed pattern, obtain maximum efficiency of operation and provide a very smooth ride.

Frequency shall range fully between zero and rated value.

The Controller shall be provided with a self diagnostic program to keep downtime to a minimum possible.

The controller shall intelligently adjust door times in response to car calls, hall calls and "Door Open" button operation.

An Inspector's changeover test switch and set of test buttons shall be provided in the controller. Operation of the Inspector's changeover switch shall make both the car and landing buttons inoperative and permit the lift to be operated in either direction from machine room for test purposes by pressing corresponding test buttons in the controller.

It shall not, however, interfere with the emergency stop switches inside the car or on the top of the car.

10.0 GUIDES AND FASTENINGS

- i. Guide-rails for car and counterweight shall consist of machined mild steel Tee sections, erected plump, and securely fastened to the lift well framing by heavy steel brackets, suitably spaced, to limit deflection of guide rails to 3 mm under normal working conditions.
- ii. The guide-rails shall be of suitable section with ends tongued and grooved, forming matched joint and shall be connected with steel fish plates.
- iii. Guide-rails shall cover the full height of the hoist way and pit, such that it shall be not be possible for any of the car or counter weights shoes to run off the guides.

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- iv. Guides shall be designed to withstand the action of safety gear when stopping a counter weight or fully loaded car.
- v. The max deviation from true plumb and alignment of guide rails shall be 2 mm.
- vi. All support framing shall be rigid and shall be designed to restrict displacement of the point of support of brackets to 3 mm under normal working conditions.
- vii. The whole guide rail installation, including expansion joints, shall be designed for a smooth ride.
- viii. The guide-rails shall be protected during storage and installation with a rust inhibiting coating which shall be cleaned off on completion of installation.
- ix. Guide-shoes shall be adjustable type & mounted so as to provide continuous contact with guide rails under all conditions.

Guide shoes shall be provided at top and bottom of each side of car and counterweight and shall be designed for quiet operation.

Additional guide shoes shall be provided on each side of buffer frame in case of oil buffers.

Each lift shall be equipped with roller guides for up and down travel. There shall not be any metal-to-metal contact between Car and rail. Roller shall be mounted on ball bearings to provide quiet operation and excellent ride quality. (It is not required in case the design varies however the ride quality shall not be compromised for any other design).

11.0 SAFETY

In addition to other specifications, the lift shall be provided with safety devices as follows:-

- i. Against overload
- ii. Safety gear on car so that in the event of rope breaking or loosening, the car will be brought to rest immediately by means of grips on the guides. The over speeding car shall be automatically brought to a gradual stop on guide rails and power supply to the hoist motor shall be switched off.

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- iii. Over speed centrifugal governor operating the safety gear in case over speeding of car in the down direction.
- iv. Car gate lock so that in the event of car gate is being opened when passengers are in the car, the lift will be brought to rest.
- v. Over travel limit switches at top and bottom limits of travel to disconnect the power supply and apply brakes to stop the car within a defined safe distance in case of over travel in either direction
- vi. Ultimate terminal switches to stop the car automatically within top & bottom clearances independently of normal over travel limit switches but with buffers operative.
- vii. Protective guards to counterweight in pit, rope sheaves and wherever required.
- viii. Toe guard apron to the platform.

12.0 CAR

a. Cabin Size

The internal clear dimensions of the cabin shall not be less than those specified in IS 17900, NBC & CPWD General specifications for electric work (Lifts). The car shall be so mounted on the frame that vibration and noise transmitted to the passengers inside is minimized.

b. Frame and Safety Device

The car frame shall consist of mild steel channel/structural steel top and bottom securely riveted or bolted and substantially reinforced and braced so as to relieve the car enclosure of all strains when the safety device comes into action due to over speed or when the capacity loaded car is run on the buffer springs at normal speed.

The safety device mounted on the bottom members of the frame operated by a centrifugal speed governor shall be arranged to bring the car to a gradual stop on the guide rails in the event of excessive descending speed; and provision shall be made to shut off the power supply to the motor.

c. Buffers

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Substantial spring buffers shall be furnished and installed in the pit under the car and counterweight. These buffers shall be mounted on RCC Pedestals in the pit. The car buffer spring must be of correct design to sustain the car with capacity load without damage should the car terminal limits become inoperative. The car buffers must be located symmetrically with reference to centre of car.

The Contractor may alternatively offer oil type buffers. The plunger shall be mild steel, designed for a very high factor of safety and accurately machined. A toughened rubber bumper shall be fitted to the plunger top to cushion the impact of steel buffer plates attached under the car and the counterweight. An oil gauge shall be provided to check the oil level.

d. Counterweight

The lift shall be suitably counter-balanced for smooth and economical operation. Cast iron weights shall be contained in a structural steel frame properly guided shoes suitable guide shoes (minimum 4 nos) It shall be equal to the total weight of lift plus approx. 50% of the contract load.

Substantial expanded metal counter-weight screen guard shall be furnished and installed at the bottom of hoist way, as required by lift inspector.

e. Hoisting and Governor Ropes

Bright steel wire ropes with fire cores suitable for lift duty as per BIS code shall be used for hoisting ropes.

Not less than 3 independent suspension ropes shall be provided and designed to share load equally by means of adjustable shackle rods with equalizer springs at each end of hoisting ropes.

Each rope shall have adequate section to provide a minimum factor of safety of 4 based on the max force on the rope.

Governor ropes shall be similar to hoisting ropes. Their ends shall be securely attached to the car and to the safety gear. The governor ropes shall be tensioned by a weight loaded device in the pit.

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The contractor shall submit the technical details and source of supply of ropes to the EPI as well as a certificate of performance of ropes from an approved test laboratory or Authority.

Compensation for travel shall be provided for all lifts having a travel of more than 30m.

f. Enclose

The car enclosure shall be as specified in technical data sheet. The cabin floor, roof and walls shall be free of distortion and undue deflection as per IS 17900

g. Brakes

D.C brakes will be spring – applied and electrically released. They shall be designed to provide smooth stops under variable loads.

h. Doors

Provision shall be made for vertical and horizontal fine adjustment of doors as per the specifications given in technical data sheet.

i. Door Operators

The door operators shall be VVVF inverter controlled heavy duty A.C motor allowing variable opening and closing speeds and full synchronization of car and landing doors.

j. Travelling Cables

Traveling cable shall be multi-core with high conductivity stranded conductors specifically designed for lift duty. The cables shall be provided with retaining straps and individual cable clamps.

k. Emergency Lighting

A self – contained, non-maintained emergency light with a trickle boost charger shall be provided.

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l. Intercom

An intercom system shall be provided between the car, main landing, machine room and Fire console room linked to EPABX.

m. Manual Cranking Facility

Manual cranking facility shall be provided in the machine room to facilitate evacuation of passengers in case of power failure. The manual mode shall be in addition to automatic car failure operation specified elsewhere.

n. Emergency Stop Switch

A stop switch in the machine room/ top of car shall be provided for use by maintenance crew to cancel all car and landing call for a particular lift.

o. Maintenance Switch

On operation of the maintenance switch located on top of the car by the maintenance crew, the car shall travel at slow speed not exceeding 0.85 m / sec by continuous operation of a button.

p. Landing Door Interlocks

Inter locks shall be provided to ensure that the car does not operate to the passengers that the car will not start as it is overloaded.

q. Overload Indicator

An overload indicator with buzzer shall be provided in the cabin to indicate to the passengers that the car will not start as it is overloaded.

r. Other Features

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All features specified in the BIS/NBC/CPWD and in the enclosed technical specifications shall be provided.

s. Lift for Disabled

All the Passengers lifts shall be suitable for use by disabled persons. The following additional facilities shall be provided in this lift.

- i. Full length handrails shall be provided on the rear and side wall panels.
- ii. The door closing time shall be set for min. 5 seconds and the door closing speed shall not exceed 0.25 m/sec.
- iii. The door open and door closed announcements shall be audibly made in the car.
- iv. Braille signs / buttons.

f. Operating Panels, Buttons & Switches

Main and secondary car operating panels, buttons and switches shall be location on the of the two front wall panels next to the car door and as specified in the schedule of lifts & as per approved G.A drawings.

All buttons and switches shall be clearly legible with fade-proof text and figures, and shall be easily accessible, (especially for disabled persons in the in the lift designated for them)

13.0 ELECTRICAL WIRING

Necessary insulated wiring to connect all part of the equipment shall be furnished and installed. Insulated wiring shall be flame retardant and moisture resistant and shall be run in G.S. Conduits. All cables shall be flame- retardant with copper conductors.

Trailing cables shall be PVC sheathed copper conductor multi-core ribbon type designed for lift service and shall be flame retardant and moisture resistant. They shall be flexible and shall be suitably suspended to relieve strains on individual conductors. All copper conductors shall be appropriate gauge copper to avoid excessive voltage drop. All wires, cables, conduits, metal boxes, fittings and earthing shall comply with statutory requirements and BIS specifications.

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The controller unit comprising of the MCCB, 25KA adjustable overload and phase reversal and phase failure protection, all the circuit elements, transformer, rectifier for D.C. control supply, inverter power pack, terminal blocks etc, shall be enclosed in an insect vermin proof, sheet steel floor or wall mounted cabinet with hinged doors at front or at both front and rear. Proper warning boards and danger plates shall be provided on both sides of the controller casing. Sheet steel used for controller cabinet shall not be less than 14 gauges and shall be properly braced, where necessary. Suitable gland plate shall be provided for cable entry. The battery for the charger unit shall be suitably placed in the machine room. Degree of protection of Enclosure shall be IP54. Enclosure shall have provision of earthing studs.

All sheet steel work shall be painted with two coats of synthetic enamel paint of suitable shade both inside and outside over two coats of zinc primer.

Apart from lift controller enclosure, adequate distribution boards (3 Main DB + DB) are required. Cables to incomer of these DB's shall be terminated by others, whereas outgoing cables for lift shall be in the scope of lift contractor. Contractor shall furnish the sizes of cables along with KW rating of motors.

14.0 PAINTING

All exposed metal work furnished in these specifications, except as otherwise specified shall be given anti-corrosive primer after approved surface treatment of metal surfaces and two coats of approved enamel paint of approved shade. After installation of lifts, a final Touch-up coat of paint shall be applied.

15.0 WORKS TESTS

The following tests shall be carried out at works and notice of the time and procedure of the tests before they are carried out, and shall be given facilities for observing the tests at works.

- a. High voltage works tests of equipment which is not already tested in accordance with appropriate IS codes.
- b. Buffer test.

16.0 TESTS ON COMPLETION

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The following tests shall be carried out to the satisfaction of the EIC

- i. Insulation resistance and earth test for all electrical apparatus.
- ii. Continuous operation of the lift under full load conditions and simulated starts and stops (150 nos. per hour each) for one hour at the end of which time the service temperature of the motor and the operating coils shall be tested. This shall be as per B.I.S specification
- iii. The car shall be loaded until the weight on the rope is twice the combined weight of the car and the specified load. The load must be carried on for about 30 minutes, without any sign of weakness, temporary set or permanent elongation of the suspension rope strands.
- iv. The following items shall be tested.
 - a. Leveling accuracy at each landing in conditions of fully loaded and empty car
 - b. No load current and voltage readings both on 'Up' and Down circuits
 - c. Full load current and voltage readings both on 'Up' and Down circuits
 - d. One and quarter load current and voltage reading both on 'up and Down circuits
 - e. Stalling current and voltage and time taken to operate overload
 - f. Overload protection
 - g. Gate sequence relays, if provided and installed
 - h. Car and landing door interlocks
 - i. Collective control and priority sequences, if installed
 - j. Safety gear mechanism for car and counterweight with fully loaded car
 - k. Speeds on Up and Down travel with full load, half load and empty car
 - l. Door contacts
 - m. Final terminal stopping device
 - n. Normal terminal stopping device
 - o. Car and counterweight buffers with contract load and contract speed
 - p. Operation of controllers
 - q. Manual operation of lift at mid-way travel
 - r. Emergency operation

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- v. Test on completion shall also be performed to the satisfaction of inspector of lifts and a certificate will be obtained from the lift inspector by the contractor
- vi. Load test to be carried out as per standard norms and approved procedures
- vii. All test to be witnessed by NPCIL representative and test report to be submitted along with drawing and other documents

17.0 STATUTORY APPROVALS

All statutory approvals from commencement to commissioning of lifts shall be obtained by the contractor from the inspector of lifts and / or other authorities. However, the client will provide all necessary assistance for providing documents, drawings and certificates pertaining to other contractors, if required.

The contractor shall pay necessary fees in connecting with the approval of installation of lift

18.0 FEATURES REQUIRED FOR LIFTS

(a) Group/independent / Attendant Operation

It shall be possible to group specified cars in a group wherever required with dynamic disposition of cars as required by the traffic pattern. A smart car dispatching system with ring communication shall be provided for optimum passenger comfort and lift performance under all traffic conditions. Any defective car shall be automatically eliminated from the group.

Each car shall be provide with key switch for independent operation housed in a service cabinet, In this mode, the lift shall respond only to car calls Hall calls will not be registered.

It should be possible for an attendant to operate any car

(b) Fireman's Switch

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A fireman's toggle switch shall be provided in a break glass for the specified lift at ground floor to enable firemen to bring the lift non-stop to ground floor from any location and to cancel hall calls until the car is operated on attendant control

(C) Emergency Power Operation

In case of power failure, standby power equipment shall enable lifts to reach a pre-determined floor in a pre – determined sequence, and then permit operation of one or more lifts on emergency power

A trickling battery shall be provided to supply power to light fixtures, fan alarm and intercom

(d) Profile Generator

A profile generator or similar device shall be provided to use the car at and optimum speed level and to improve leveling accuracy.

(e) Predictive Car Selection

Once a hall call is registered a dynamic car algorithm shall transfer the call to an optimally selected car to provide the maximum traffic efficiency

(f) Home Landing Facility

A car shall return to a pre – determined landing after the last call is answered

(g) Door Safety

Multi-beam infrared/ ultrasonic electronics curtains shall be provided to scan the doorway and reverse the door closing in case of any obstruction

(h) Double Door Operation

If both up and down calls are registered at a hall which is the last registering hall in the direction of the car the lift shall travel to that hall and open/ close the doors. After this the

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Jerk level	-	0.9 – 1.5 m/s ³
Noise level in car (Max.)	-	58 dB
Noise level at 1 M in machine room	-	60dB
Acceleration rate	-	0.6 – 1.0 m/s ² (adjustable)
Max car vibration	-	20 milli gals

20.0 SUBMITTALS:

- i. Catalogues with offered items highlighted
- ii. List of imported components, if any
- iii. Compliance statement for guaranteed performance parameters' given in Specification 19.0 above.
- iv. Confirmation that offer submitted meets the technical specification & system in this work and there are no deviations and exclusions from NIT
- v. The contractor shall specify in his offer the full capability of his system in this regard.

(B) The successful contractor shall furnish following technical particulars of the equipment/ devices for the approval by project Engineer.

- (i) Single line/ schematic diagram of electronic control panel, lift & equipment etc
- (ii) Layout of Hoist way, Lift machine room, showing foundation details in the pit, machine room, electric control panel, lift & equipment etc.
- (iii) Earthing layout
- (iv) Inspection manual for equipment & accessories covered in the scope of supply
- (v) Technical literature of operation, control and maintenance etc. (5 Copies) along with pendrive
- (vi) Schedule of scope of maintenance service during defect liability period

The technical parameters furnished by the contractor would be examined in detail during submission stage. All improvements considered necessary to meet the tender. Technical

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Specifications would have to be incorporated without any additional cost to Project Engineer with objective of providing high performance and safety lifts.

21.0 MAINTENCE DURING DEFECTS LIABILITY PERIOD

Comprehensive maintenance during Defects Liability Period inclusive of periodic servicing, prompt attention to Project Engineer complaint, prompts rectification of all malfunctions and equipment failure, replacement of defective equipment/ parts, replacement of light fittings, lubrication including lubricates, maintaining correct alignment and leveling of cars and ensuring smooth running, starts and stops etc, all complete to Project Engineer's satisfaction shall be done

PASSENGER ELEVATOR 8 PERSONS CAPACITY FOR RESIDENTIAL & PUBLIC BUILDINGS

LOAD & SPEED : About 544 Kgs. (8 persons) @ 1.00 meters per second

TRAVEL : Ground floor to Tenth floor with head room.

STOPS & OPENINGS : 11 stops & 11 openings (G + 10 Floor)(All openings on the same side)

POWER SUPPLY : 415 Volts 3 Phase 50 Hertz Alternating Current

CONTROL : A.C Variable Voltage Variable Frequency (With Close Loop) for doors and main hoist

OPERATION : Simplex Full Collective with / Without Attendant (Auto & attendant)

MACHINE : PM Gearless (Located inside the shaft)

CAR SIZE : About 1100 mm wide x 1400 mm deep x 2500 mm high
– Inside Dimensions, subject to confirmation of CIVIL drawing.

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HOIST WAY REQUIRED : About 1900 mm wide x 1800 mm deep – Finished Dimensions

CAR ENCLOSURE :

CAR PANELS Stainless steel car windows

HANDRAILS Round shaped stainless steel handrail

FALSE CEILING CD-41 (PC)

FLOORING Carpet design vinyl tiles

CAR ENTRANCE : Stainless steel opening sliding door window.
Clear opening about 800mm wide, x 2100 high

DOOR OPERATIONS : Automatic with VF Door Operator & Electronic Door Protection Device

SIGNALS (DESIGN) :

DETAILS :

1. Combined hall button with Digital display at all floors
2. Car Operating Panel with micro stroke push button with digital
3. Fireman's switch provided at main lobby
4. Battery operated alarm bell and emergency light
5. Voice synthesizer
6. Car chime

ALL SIGNAL FIXTURES IN STAINLESS STEEL FACE PLATES

PASSENGER ELEVATOR 15 PERSONS CAPACITY FOR RESIDENTIAL BLOCKS.

LOAD & SPEED : About 1020 Kgs. (15 persons) @ 1.00 meters per second

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- TRAVEL** : Ground floor to Tenth floor with head room.
- STOPS & OPENINGS** : 11 stops & 11 openings (G + 10 Floor)(All openings on the same side)
- POWER SUPPLY** : 415 Volts 3 Phase 50 Hz Alternating Current
- CONTROL** : A.C Variable Voltage Variable Frequency integrated controller (With Close Loop) for doors and main hoist
- OPERATION** : Simplex Full Collective with / Without Attendant (Auto & attendant)
- MACHINE** : PM Gearless (Located inside the shaft)
- CAR SIZE** : About 1000 mm wide x 2500 mm deep x 2500 mm high – Inside Dimensions, subject to confirmation of CIVIL drawing.
- HOISTWAY REQUIRED** : About 1900 mm wide x 2900 mm deep – Finished Dimensions
- CAR ENCLOSURE** : **CAR PANELS** Stainless steel car
HANDRAILS Round shaped stainless steel handrail
FALSE CEILING CD-35 (PC)
FLOORING Carpet design vinyl tiles
- CAR ENTRANCE** : Stainless steel opening sliding door.
Clear opening about 900mm wide, x 2100 high
- DOOR OPERATIONS** : Automatic with VF Door Operator & Electronic Door Protection Device
- SIGNALS (DESIGN)** :

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- DETAILS** :
1. Combined call button with Digital display at all floors
 2. Car Operating Panel with micro stroke push button with Digital
 3. Fireman's switch provided at main lobby
 4. Battery operated alarm bell and emergency light
 5. Voice synthesizer
 6. Car chime

ALL SIGNAL FIXTURES IN STAINLESS STEEL FACE PLATES

ANNEXURE - I

SPECIFIC REQUIREMENT FOR ELEVATOR

DATA SHEET – GENERAL DETAILS

1.0 OPERATING AND INDICATING DEVICES IN THE CAR

1.0	Push buttons for each landing	:	Yes
2.0	Non stop push button	:	Yes (with attendant mode only)
3.0	Door open push button	:	Yes
4.0	Door close push button	:	Yes
5.0	Alarm push button	:	Yes
6.0	Key operated selector for attendant /operator modes	:	Yes
7.0	Up direction indicator	:	Yes (Digital)
8.0	Down direction indicator	:	Yes (Digital)
9.0	Floor position indicator	:	Digital display
10.0	Over load indication inside the car	:	Yes (sound & illumination)
11.0	Emergency light and alarm	:	Battery operated alarm bell / hooter and emergency light with rechargeable battery and automatic battery charger.
12.0	Emergency exit (Suitable opening through car top is	:	As per lift rules ASME A17.1

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	preferable)		
13.0	Telephone (Auto)	:	Yes (To connect with Township auto exchange)
14.0	Telephone intercom on car top	:	For establishing communication between car, lift pit and machine room.(For facilitating maintenance and breakdown works)

2.0. OPERATING AND INDICATING DEVICES IN EACH LANDING

2.01	Call registration button - up	:	Yes (bell and blinking illumination in push button)
2.02	Call registration button- Down	:	Yes (bell and blinking illumination in push button)
2.03	Car position indicator in all landing	:	Digital display
2.04	Location of the position indicator	:	Top side of the door
2.05	Up direction LED / Digital indicators in all landings	:	Yes
2.06	Down direction LED / Digital indicators in all landings	:	Yes

3.0. OPERATING DEVICES IN THE MACHINE ROOM

3.01	Up push button	:	Yes
3.02	Down push button	:	Yes
3.03	Hand cranking devices	:	Yes
3.04	Stop push button	:	Yes
3.05	Floor position indicator	:	Yes
3.06	Volt meter and ammeter analogue display in LCP (local control panel) of lift to be provided. To ensure 3 phase	:	Yes

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	availability, LED lamps of R, Y, B shall be mounted on LCP.		
3.07	Gear oil level in gear mechanism	:	Glass window to view oil level

4.0. OPERATING DEVICES ON THE TOP OF THE CAR (YES / NO)

4.01	Slow speed operating selector to facilitate maintenance work	:	Yes
4.02	Up push button	:	Yes
4.03	Down push button	:	Yes
4.04	Stop push button	:	Yes
4.05	5Amp, 240V AC Power supply socket with switch on car top.	:	Yes
4.06	Provision for lighting (240V AC) on car top with a switch.	:	Yes
4.07	Cable terminations in an enclosed junction box neatly mounted on car top. (Making no entry for water or any reptiles)	:	Yes

5.0. CAR DOORS AND LANDING DOORS

5.01	Type of door for car	:	Center opening sliding / type of door with auto operation with variable frequency door operation.
5.02	Type of door for landing	:	With necessary interlock as per IS
5.03	Colour shade for outside landing doors	:	As per specification
5.04	Colour shade for car doors	:	As per specification
5.05	Material of the doors	:	Stainless steel
5.06	Size of the door	:	As per IS:17900

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5.07	V.F. Door operator	:	Yes
5.08	Material of car enclosure	:	Stainless steel hairline finish
5.09	Full length infra-red sensor mounting	:	Yes

6.0. MISCELLANEOUS DETAILS

6.01	Car lighting	:	Decorative light and fittings (Decent look)
6.02	Car ventilation fan	:	With auto ON & OFF provision
6.03	Cabin Fan	:	With auto ON & OFF provision
6.04	Provision for door opening at each landing in case of emergency	:	Yes
6.05	Fireman switch control	:	Yes
6.06	All face plates	:	Stainless steel
6.07	Intercom telephone set at 3 locations	:	Yes
6.08	Provision for Public Address System	:	Yes
6.09	Hand rail inside car	:	Yes (Stainless Steel)
6.10	Operating device & indication	:	Illumination type
6.11	Flooring details	:	As per specification
6.12	Facial plates	:	Yes
6.13	Digital Hall position indicators	:	Micro push touch button & luminous type.
6.14	Buttons	:	Micro push touch button & luminous type
6.15	Painting	:	Epoxy paint
6.16	Voice Guidance system (Voice	:	Yes

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	Synthesizer)		
6.17	Lift license	:	To be arranged by contractor.
6.18	Instruction display board on metallic finish surface inside car (DOs & DON'Ts)	:	Yes (Tamil & English)

.00 SPECIAL REQUIREMENTS

415 Volts A.C. 3-phase 50 cycles/sec. 4-wire system 63 Amps and two separate earth points with switch fuses only shall be provided in machine room to contractor. Other requirements are to be provided by the contractor which includes providing and fixing of wall / floor mounted main power control panel for lift comprising MCCB/MCBs, ELCBs, Indicator lamps, Voltmeter (0-500V) 15 Amps, socket and 15 A switches along with lighting of lift shaft etc.

Note: The above specifications are given for general guidance. It may vary from manufacturer to manufacturer. Acceptance / Approval of change of specifications lies with Engineer-in-Charge.

SAFETY

- Over speed Governor- operable with Mechanical device & Electronic device.
- Highly proven mechanism to prevent free fall of car. (The maximum allowable travel distance during free fall shall be 500mm while testing)
- Bottom springs
- Manual rescue device (insertion of liver key through the landing doors)
- Auto Rescue Device (ARD)
- Device for sensing the lonely entry of child (underage) to the car by its weight up to 15kg and blocking the lift movement.
- Bulk head lightings on the wall of lift shaft at equal interval throughout the length of shaft with on/off control in machine room (NPCIL scope).
- Trailing cables neatly dressed up and tied together with appropriate clamps.

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- Pit switch (to switch on/off lift while working in lift pit).
- Fire man switch control

GENERAL

- Requirement of separate cooling fan motor for the Hoist motor to be considered in the design as the lift shall be in continuous operation.
- “Winding temperature high” tripping shall be included in lift control circuit for hoist motor.
- Electrical protection tripping like earth fault, over current, no voltage, single phasing, phase reversal etc shall have display / announcing scheme inside local control panel (LCP) to know the cause of failure of lift.
- Mal-functioning / non-working of safety schemes of lift like landing doors remaining open, car doors remaining open, over travel up, over travel down, over speed governor actuation etc also shall have display / announcing scheme inside local control panel (LCP) to know the cause of failure of lift.
- Display for ensuring availability of AC power supply, DC power supply and various control supply shall be included in the lift control.
- Safety instruction and emergency contact no’s were properly fixed inside the lift with and metal board.
- During commissioning of lift, the functional checks of lift including load testing shall be carried out by the manufacturer.
- The rates quoted by the manufacturer shall be inclusive of lift supply, transportation, storing, and erection, commissioning and testing.
- All 10 lifts shall be of same make.
- Rates for comprehensive/non- comprehensive maintenance contract of lift (for the first year and for subsequent years) to be specified separately by the lift manufacturer.

DOCUMENTS:

- Control circuit diagram shall be provided.
- Circuit diagram of electronic control boards shall be provided.

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- Procedure for “Load testing of lift” shall be given which shall contain the periodicity of load testing, amount of load to be used, checks on wire ropes before and after load testing, acceptance criteria etc. along with instruction manual of lift.
- Lift manufacturer may provide manufacturer’s instruction manuals containing specifications of major components used in the lift. If necessary, test certificates of such components used shall also be arranged.
- Approval of lift authorities – license.

ANNEXURE – IA

SPECIFIC REQUIREMENTS FOR PASSENGER ELEVATOR.

Operating conditions:-

Climatic conditions : The climate is tropical, highly humid and low to medium rainfall of around 750mm per year conducive to rust and fungus growth. Besides being close to sea coast environment is laden with salt spray.

Ambient temperature : 35° C maximum, 18° C minimum

Humidity : 35 to 98%.

SALIENT PERFORMANCE REQUIREMENT:-

1.00 GENERAL

1.01 Lift category : Passenger

1.02 Installation : Indoor

2.00 LIFT PARTICULARS

2.01 Rated load : 8 Persons/ 15 persons as per standard specifications.

2.02 Rated speed : 1 Meter / Sec.

2.03 Total (Travel in meters) : 40 Meter (Appx.)

2.04 Floors entrances served : Gr. Floor + 10 floors

2.07 Leveling accuracy (not greater than) : ± 4 mm. (maximum)

2.08 Type of doors in the car : Horizontal and centrally open able in both sides

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- by VVVF door operator (2 speed)
- 2.09 Car enclosure : Stainless Steel 18 Gauge.
- 2.10 Car inside size of the lift : As per I.S
- 2.11 Clear opening provided by the car and hoist way entrance doors : As per I.S
- 2.12 Machine room dimensions and location : As per drawing enclosed.
- 3.00 LIFT CONTROL OPERATION**
- 3.01 Type of control : AC variable voltage and variable frequency (ACVVVF) drives with microprocessor based control "YASAKAWA" make V3F drive is preferred.
- 3.02 Type of operation : DUPLEX full collective and selective with / without attendant.
- 3.03 Automatic operation type : DUPLEX control

Note:- The above specifications are given for general guidance. It may vary from manufacturer to manufacturer. Acceptance / Approval of change of specifications lies with Engineer-in-Charge.

ANNEXURE - II

SPECIFIC REQUIREMENT SHEET OF CONTROL PANEL

DATA SHEET

1.00 GENERAL PARTICULARS

- 1.01 Designation : Control panels / cubicles / cabinet for elevators – power & control.
- 1.02 Location : Indoor
- 1.03 Design ambient temperature : 45 Deg. C
- 1.04 Type of mounting (floor/pedestal/wall) : Vendor to decide
- 1.05 Cable entry
- a) Top / bottom : Top

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- b) Glands / Conduits : Glands
- 1.06 Painting
- a) Colour finish outside : Shade 631 of IS:5
- b) Colour finish inside : White
- c) Paint required : Synthetic Enamel
- 1.07 Control scheme & bill of material : To be furnished by the Bidder.
- :
- 2.00 VOLTAGE
- 2.01 Supply voltage for power devices : 415V, 3-phase, 3-wire solidly grounded
motor drives etc. 50 Hz
- 3.00 OTHER PARTICULARS
- 3.01 Starter type : VVVF
- 3.02 Contractor rated duty : As required

Note:- The above specifications are given for general guidance. It may vary from manufacturer to manufacturer. Acceptance / Approval of change of specifications lies with Engineer-in-Charge.

INTERNAL & EXTERNAL ELECTRIFICATION WORKS**TABLE OF CONTENTS**

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10.0	LIST OF APPROVED MAKES
11.0	ABBREVIATIONS USED

1.0 SCOPE

This specification defines the requirements for the supply of equipment, materials, installation, testing and commissioning of the electrical system (Main panels, PDBs, LDBs, electrical fixtures, conduits, cabling etc.).

2.0 APPLICABLE CODES AND STANDARDS

- 2.1** The work shall be carried out in the best workman like manner, in conformity with this specification, Installation Standards, and the relevant specifications/codes of practice of the Bureau of Indian Standards.
- 2.2** In addition to the above it shall be ensured that the installation conforms to the requirements of the following as applicable:

List of specifications

SL.NO	IS NO	Description
1.	IS – 2629, 2633	Galvanising
2.	IS – 3043	Code of Practice for Earthing
3.	IS – 2274	Code of Practice for Electrical wiring installations
4.	IS – 2584	Method of test for electric strength of solid insulating materials at power frequencies
5.	IS – 694	PVC insulated cables (for voltages up to 1100 volts)
6.	IS – 8130	Conductors for insulated electric cables and flexible cords
7.	IS – 2551	Danger Notice plate
8.	IS – 5216	Guide for safety procedures and practices in electrical works
9.	IS – 5578	Guide for making of insulated conductors
10.	IS – 3975	Mild steels wires, strips and tapes for armouring cables
11.	IS – 5831	PVC insulation and sheath of electric cables
12.	IS – 1554	PVC insulated (heavy duty) electric cables
13.	IS – 1753	Aluminium conductors for insulated cables
14.	IS – 3975	Mild steels wires, strips and tapes for armouring cables
15.	IS – 10810	Testing of cables
16.	IS – 4012	Dust proof electric lighting fittings
17.	IS – 4013	Dust light electric lighting fittings
18.	IS – 2208	HRC cartridge fuse links up to 650 volts
19.	IS – 2147	Degree of protection provided by enclosures for low voltage switch gear

		and control gear
20.	IS – 2675	Enclosed distribution fuse boards and cut outs for voltages not exceeding 1000 volts
21.	IS – 0159	Ready mixed paint, brushing, and bituminous, black resisting for general purposes
22.	IS – 3854	Switches for domestic and similar purposes
23.	IS – 1913	Electric light fittings, general and safety requirements
24.	IS – 9224, 8623	HRC fuses
25.	IS – 4237	General requirement for Switch gear and control gear for voltages not exceeding 1000VAC/1200VDC
26.	IS – 6005, 2075	Painting
27.	IS - 722	AC Electric Meters
28.	IS - 11353	Guide for uniform system of marking and identification of conductor and apparatus terminals
29.	IS - 1248	Direct acting electrical indicating (analogue) measuring instruments and their accessories
30.	IS - 6875	Control switches for voltages upto and including 1000 VAC/1200 VDC
31.	IS - 2705	Current transformers
32.	IS - 3231	Electrical relays for Power system protection
33.	IS – 2959	Contactors for voltages up to and including 1000 VAC/1200 VDC
34.	IS - 3156	Voltage transformers
35.	IS - 5082	Aluminium for Electrical purposes
36.	IS - 4064	AB switches for voltages up to and including 1000 VAC/1200 VDC
37.	IS - 8828, 2516	Circuit breakers
38.	IS - 1255	Installation and operation of power cables
39.	IS - 2576	ACBs
40.	IS - 732	Code of practice for electrical wiring
41.	IS – 5831	PVC insulation and sheath of electric cables
42.	IS – 1554	PVC insulated (heavy duty) electric cables
43.	IS – 1753	Aluminium conductors for insulated cables
44.	IS – 3975	Mild steels wires, strips and tapes for armouring cables
45.	IS – 2675	Enclosed distribution fuse boards and cut outs for voltages not exceeding 1000 volts
46.	IS - 9537	Conduits for electrical installations
47.	IS - 3419	Fittings for electrical conduits
48.	IS - 371	Specification for Ceiling Roses
49.	IS - 1293	Plugs and Socket-Outlets of Rated Voltage Up to and Including 250 Volts

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		and Rated Current Up to and Including 16 Amperes
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- National Electrical Codes
- Indian Electricity Act and Rules.
- Regulations laid down by CEA/Electrical Inspectorate.
- Any other regulations laid down by central/state/local authorities and Insurance agencies.

3.0 MATERIALS AND WORKMANSHIP

All materials, fittings and appliances supplied by the contractor shall be new, unused and of the best quality and shall conform to the specifications given hereunder. They shall be manufactured in accordance with the latest revision of the specifications of Bureau of Indian Standards/International standards. In the absence of any specifications for a particular item, contractor shall bring material samples along with proven track record to site and get the same approved by Engineer-in-Charge/Owner before installation.

Samples of all the materials shall be submitted and got approved before bulk supply.

4.0 SITE CONDITIONS

All equipments / materials shall be suitable for operating satisfactorily in a tropical, humid and corrosive atmosphere.

5.0 GENERAL FUNCTION AND DESCRIPTION

5.1 Lighting system design shall conform to relevant Indian and International Codes and Standards, IES Hand Book and shall take into consideration the requirements from point of view of safety and ease in operation and maintenance.

5.2 System shall consist of rising main, panels, Power distribution boards (PDB), lighting distribution boards (LDBs), conduits, fixtures, junction boxes, cables, cable metal structures etc. as specified.

5.3 Contractor shall prepare the lighting layouts / modify the existing layout drawing based on the requirements specified in this Technical Specification and other referred documents/ drawings attached in the tender and got approved before start of work. The electrical contractor shall determine, with approval of Engineer-in-

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Charge, the exact locations of each fixture before finalisation. The drawings / SLDs provided are for guide lines only.

- 5.4** The minimum quantity and layout of electrical equipments shall be as per the drawings attached. However the final drawing with quantity and layout shall be submitted and got approved before execution of work.

6.0 TECHNICAL REQUIREMENTS

6.1 General

- 6.1.1** Electrical supervisor should possess a valid supervisory licence issued by the Electrical licensing board. Work has to be carried out only by the eligible workmen under the supervision of a full time supervisor. NPCIL may ask contractor to remove a workmen of the contractor if he found not suitable / qualified for the job. At any point of time one responsible person should be kept from the beginning to end of the job on full time basis.
- 6.1.2** All meters like kWh meter, ammeter, voltmeter, etc. has to be calibrated in an approved testing laboratory before energisation and test report should be furnished.
- 6.1.3** All rates quoted shall be inclusive of all sundry materials like hardware, clamps, cleats, nuts and bolts, cement and sand, coke and slag, solders, fluxes including all consumables like electrodes, gases etc
- 6.1.4** The quantities covered in the table / drawings are tentative and final quantity may be worked out based on the approved drawing in consultation with the Engineer in-charge.
- 6.1.5** Extra item of works not covered in the schedule of the works has to be carried out by the contractor at mutually agreed rates and as per the terms and conditions of Contract (GCC)
- 6.1.6** Quantity of materials to be supplied / purchased shall be assessed before placing the order.
- 6.1.7** The makers of material shall be as per the approved list. Any deviation in the maker of material due to non-availability etc shall have to be approved by the Engineer-in-charge

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6.1.8 All works carried out by the contractor shall have to be guaranteed for twelve months from the date of completion

6.1.9 All electrical equipments shall be earthed through earth conductors.

6.2 Technical

Each flats will have two separate power supply arrangement i.e. All power plugs (16A), AC supply, Kitchen 6A sockets and water heater supply shall be fed from Power Distribution Board and lighting supply, Fridge and 6A sockets shall be fed from Lighting Distribution Board.

For feeding the supply to individual flats, two sets of bus-ducts i.e. Lighting power supply rising main bus duct and power supply rising main bus duct are to be provided at both sides in electrical shaft. Total two sets of rising main bus duct for power supply (250A) and two sets of rising main bus duct for lighting supply (160A) as shown in the drawing.

Power / Lighting panels / boards / DBs shall be of approved make as per the table and shall be dust and vermin proof. Panels shall be indoor/outdoor type as specified. Indoor type panels shall have minimum IP42 degree of protection and shall be suitable for surface or flush mounting as specified.

Panels shall have incoming and outgoing feeders as per the specifications of SOQR / SLD. Panels shall be equipped with phase, neutral and earth bus bars of required current carrying capacity mounted on supporting insulators. RCBOs /Switches / isolators / MCB etc shall be mounted in such a way that the operating levers project outside the front metal cover plates for ease of operation. A hinged door to cover the operating knobs shall be provided. In addition, a circuit diagram indicating incomer details and outgoing details viz. Circuit number, circuit rating, and load connected and details of the load shall be pasted inside the panel. Also a laminated copy of the diagram shall be provided inside the panel in a suitably designed pocket. Two external earthing studs for connection to the earthing grid shall be provided on the panel. Complete wiring inside the panel, shall be neatly bunched with PVC tape and button. The panel shall have knock out holes or removable gland plate for the entry of incoming and outgoing conduits or cables. The panels shall be complete with requisite number of cable glands.

6.2.1 Power Distribution Board (PDB) for B type quarters(Item no-1.1)

12 way single phase SPN DB complete with acrylic door, IP 43, IK 09, flush mounted type factory made distribution board complete with interconnection Copper bus bar,

Neutral bar, Earth bar, top and bottom removable gland plates with knockout and with the following RCBO/MCBs with 63A DP RCBO (30m A) - 1 no, 20A/16A / 6A SP MCB - 8Nos

6.2.2 Power Distribution Board (PDB) for D special and E type ,F-type quarters (Item no-1.2)

4 way TPN distribution board complete with acrylic door, IP 43, IK 09, flush mounted type factory made distribution board complete with interconnection Copper bus bar, Neutral bar, Earth bar, top and bottom removable gland plates with knockout and with the following RCBO/MCBs with 63A FP RCBO (30m A) - 1 no, 20A/16A / 6A SP MCB – 12 Nos

6.2.3 Lighting Distribution Board (LDB) (Item no-2)

12 way single phase SPN DB complete with acrylic door, IP 43, IK 09, flush mounted type factory made distribution board complete with interconnection Copper busbar, Neutral bar, Earth bar, top and bottom removable gland plates with knockout and with the following RCBO/MCBs with 32A DP RCBO (30m A) - 1 no, 20A/16A / 6A SP MCB - 8Nos

6.2.4 Supply to individual flats shall be tapped from the rising main bus duct with tap off arrangement as per specification /drawing. MCB for each feeder (power as well as lighting) to flats shall be mounted on the tap off box fixed on the bus duct in corresponding elevation / floor and Energy meter in Junction boxes provided in shaft room. Communication port shall be provided from each energy meter for communication network.(Items no-6,7,8,9)

6.2.5 Wiring from individual tap off / energy meter to distribution boards in flats / rooms shall be done with FRLHF insulated single core Copper conductor wires (without joint) as given below through pre laid FRLS PVC conduits.(Items no-6,7,8,9)

- For PDB - Two runs of 10 sqmm wire and one run of 4 sqmm shall be used.
- For LDB - Two runs of 6 sqmm and one run of 2.5 sqmm wire shall be used.
- For Lift/Elevators Control Distribution Boards, common PDB for common area sockets - Two runs of 6 sqmm and one run of 2.5 sqmm wires shall be used.
- For Common LDB for area lighting - Two runs of 6 sqmm and one run of 2.5 sqmm wire shall be used.

6.2.6 Common PDB - for power sockets in common area: (Item no-3.1)

Two separate power distribution board shall be installed in the electrical panel room at ground floor to feed the power plugs at common area as per the drawing.

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4 way three phase distribution board complete with metal door, IP 43, IK 09 with interconnection Copper bus bar, Neutral bar, Earth bar, top and bottom removable gland plates with knockout and with the following RCBO/MCBs with 63A 4P RCBO (30mA) - 1 no, 20A/16A / 6A SP MCB - 12Nos

6.2.7 Control DB for lift/Elevator – 02 No's per building(Item no-3.2)

12 Way SPN DB complete with metal door, IP 43, IK 09, flush mounted type factory made distribution board complete with interconnection Copper bus bar, Neutral bar, Earth bar, top and bottom removable gland plates with knockout and with the following RCCB with 40A, 4Pole - 1 no, 32A/25A, 4Pole, MCB – 1 No, 10A, 2 Pole MCB – 01 No, 6A, 2 Pole MCB – 01 No

Lift/Elevator Main motor, car lighting, UPS and control circuit, and power has to be connected with MCB control and fed from rising main.

6.2.8 Power DB for lift/Elevator – 02 No's per building(Item no-3.3)

12 Way SPN DB complete with metal door, IP 43, IK 09, flush mounted type factory made distribution board complete with interconnection Copper bus bar, Neutral bar, Earth bar, top and bottom removable gland plates with knockout and with the following RCCB/MCBs with 40A 4P RCCB (30mA) - 1 no, 32A/20/16A/6A 2P MCB – 01 No, 32A/20/16A/6A 4P MCB – 01 No

6.2.9 63Amps TPN FN switch with 63Amps HRC Fuses: (Item no-18)

63Amps TPN FN switch with 63Amps HRC Fuses in M S enclosure and angle iron frame with necessary interconnections, and other associated accessories. The box shall have a provision to terminate 4C 16Sq.mm. Al. Armoured. Cable on both sides without any problem. The panel shall be installed in lift room. 4Cx16 sqmm AL armoured PVC cables for the panel shall be supplied and terminated as per standards.

6.2.10 Common LDB - for lighting common area – 4 No's per building: (Item no-3.4)

Separate lighting distribution board's shall be installed in the building as per requirement to feed power supply and control the light fittings of common area such as Electrical rooms, staircase, corridor, parking, outside area of buildings etc. as per the drawing.

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4 way three phase distribution board complete with metal door, IP 43, IK 09 , with interconnection Copper bus bar, Neutral bar, Earth bar, top and bottom removable gland plates with knockout and with the following RCBO/MCBs with 63A 4P RCBO (30m A) - 1 no, 20A/16A / 6A SP MCB - 12Nos

6.2.11 Auto controller for lighting of common area (Item no-4.1& 5.1)

All the lights in common areas such as staircase, corridor, parking, outside area of buildings etc. Shall be controlled through auto controllers with following components.

A) Auto controller Timer Box for common lights (01 No per building) - with 230V timer -1 no- (Analogue Time switch 230V, as per IEC60730-1 Analogue dial -24 hrs with manual over ride switch with min. 100 hrs working reserve), 230V, 32A 4 pole contactor -1 no, MCB with C curve-10KA - 32 A 4 pole-1 no., 6A DP MCB - 01 Nos ,all assembled in a Thermoplastic polystyrene MCB Enclosure suitable for 1 row 18 module provision with DIN channel (without MCB). Hinged transparent door with locking arrangements in optional, PE+N terminal fixed, key features of Dust, Water proof, Anti corrosive, Insulated and Shock Proof, four side pre-moulded knockouts wall for cable entry, internal embedded polyurethane gasket, Mounting with elongated holes for adjustment including with dust caps, condensed water membrane provision, Glow wire test IEC 60695-2-11: 750 °C, UL Subject 94: V-2, impact resistant IK07, flame-retardant, halogen-free silicone-free "halogen-free"- Toxic behaviour accordance with IEC 60 754-2, confirm to low voltage directive 2006/95/EC, Self-extinguishing, the enclosure should be according with IEC 60439-3. Thermoplastic box dimensions approximately: 400 X 333 X 129 mm with provision for terminating the incoming and outgoing cables as per the specifications and as instructed by the ENC.

B) Auto controller contactor box for common lights (03 No's per building) - with 230V, 32A 4 pole contactor -1 no, MCB with C curve-10KA - 32 A 4 pole-1 no., 6A DP MCB - 01 Nos all assembled in a Thermoplastic polystyrene MCB Enclosure suitable for 1 row 18 module provision with DIN channel (without MCB). Hinged transparent door with locking arrangements in optional, PE+N terminal fixed, key features of Dust, Water proof, Anti corrosive, Insulated and Shock Proof, four side pre-moulded knockouts wall for cable entry, internal embedded polyurethane gasket, Mounting with elongated holes for adjustment including with dust caps, condensed water membrane provision, Glow wire test IEC 60695-2-11: 750 °C, UL Subject 94: V-2, impact resistant IK07, flame-retardant, halogen-free silicone-free "halogen-free"- Toxic behaviour accordance with IEC 60754-2, confirm to low voltage directive 2006/95/EC, Self-extinguishing, the enclosure

should be according with IEC 60439-3. Thermoplastic box dimensions approximately: 400 X 333 X 129 mm with provision for terminating the incoming and outgoing cables as per the specifications and as instructed by the ENC

6.2.12 Mounting height of equipment shall be as under:-

Bottom of Switch Box	: 1300 mm from FFL (Finished floor level)
Bottom of LDB / DB's	: 2000 mm from FFL
Lighting fixture	: Minimum 2.5 m above floor level

6.2.13 Wiring for light, fan etc. shall be in general confirm to IS: 732 and shall be as described further below.

6.2.14 Wiring circuits and point wiring.(Items no-6,7,8,9)

Wiring circuits and point wiring shall be done in the heavy duty FRLS PVC conduit(2.2 to 3mm thickness). All internal conduits shall be of minimum 25 mm dia and number of wires shall not exceed as per IS. The incoming supply wires from energy meter box to DB shall be taken through 32 mm dia PVC conduit. The wiring shall be carried out by using 1100 volts flexible single core multi strand FRLS 1.5/2.5/4/6/10 sq. mm wires as per the schedule. The earth wire shall run along the wiring for earthing the sockets, fans etc. and DBs. The wiring termination under every item shall be through crimping type Copper lugs of approved make for wires of 1.5 mm and above. The wiring and location of the light and switch points shall be carried out as per drawing and site conditions and as per the approved drawing / instructions of the Engineer-in-charge

All primary lighting points shall be wired from the respective switchboards / DBs with switch / MCB control as specified. For secondary points without control, the wires may be looped from the primary points. / DBs. Installation of switches, power sockets and telephones socket, etc. with mounting plate shall be as per the schedule, specifications and the instruction of the Engineer-in-charge. Wherever possible, all main switch boards shall be provided with minimum one extra switch provision (for future requirement) and kept blanked with dummy plate.

All items such as 1.5/2.5/4/6/10 sq.mm wire, PVC conduit ,Cage clamp type terminal blocks, hylam sheet for JB's, shall be supplied by the contractor as per the requirement & specification

The entire switches/Sockets colour shall be Ivory.

All wires shall be terminated either in switch / socket / MCB / ceiling rose / angle batten etc. Equipment such as tube light / fan/ bell etc shall be connected only from

ceiling rose with 3 core 1 sqmm sheathed cable. Body earthing of all electrical equipments shall be done with green colour earth wires of minimum 1.5 sqmm.

6.2.15 Not more than 10 light / fan / 6A plug points shall be wired in one circuit / switchboard where the main circuit wiring is done with 2.5 Sq.mm copper wires(from DB to switchboard). In case of 16A plug points, not more than two points shall be wired from one circuit unless specified otherwise. For water heater and AC separate circuits shall be taken directly from DB.

6.2.16 No joining of wires using insulation tape etc. shall be allowed in conduits or junction boxes except neutral and earth at switch boards. All termination shall be properly done on switchboards, ceiling rose, socket outlet or terminal blocks

6.2.17 The contractor shall fix the fan regulators/SP switches/ Sockets/Metal clad plug sockets, etc. as required to suit the site.

6.2.18 All control switches and sockets shall be of modular type confirming to relevant standards. All switches and sockets outlets shall be mounted in a suitable size box of G.I./MS-Epoxy powder coated, manufactured by the supplier of the switch and sockets with ample space for connection and disconnection of wires. All socket outlets shall invariably have their third (earth) pin connected to main grounding / earthing grid. All boxes shall be provided with dummy cover plate to avoid ingress of concrete / cement mix during civil works.

6.2.19 Fittings and accessories such as ceiling rose, lamp holders, fan hooks etc.: (Items no-6,7,8,9)

- Ceiling rose shall be of 3 plates, confirm to IS: 371 and 'ISI' mark.
- All lamp holders shall be bayonet cap type unless specified and confirm to the relevant Indian Standards and shall be provided with shade carrier.
- For Light points, the contractor shall install angle holder or 3 plates ceiling rose as applicable, on hylum cover as required at no extra cost. The contractor shall supply and install all consumables including LED lamps to complete the job in all respects.
- Socket outlet and plugs: Every socket outlet shall be controlled by a switch which shall be on the live side of the line and shall preferably be located immediately adjacent there to.
- Concealed GI / chromium plated metallic fan hook box of 100 mm dia and 75 mm depth with 8 mm metal rod hook at roofs shall be buried with the casting. The fan hook box shall be fabricated from new metal.

- For Fan points, the contractor shall supply and install the modular step type regulators as specified. The fans shall be connected with 3 core, 1.0 sq. mm copper FRLS insulated sheathed cables. Cylindrical GI boxes, suspension hooks with fully enclosed TBs of Wago / connect well make (cage clamp) shall also be supplied and installed as per schedule.
- The exhaust fan point shall be wired as near the place of installation as possible. A circular hole to the size of the exhaust fan shall be provided at the proper place in the wall with bird guard or stainless steel wire mesh of min.0.5 mm thick with suitable metallic frame to avoid entry of birds, rats and reptiles and an automatic louver for avoiding entry of dust. The mounting ring shall be fixed by means of anchor fasteners. The hole and other items shall be neatly plastered to the original finish of the room. If desired a suitable cylindrical box of 1.6mm (16 SWG) thick metal sheet may be grouted in the circular hole. The box shall be painted with matching colour over a coat of red oxide primer.

6.2.20 Boxes for switch boards: (Item no-15)

Supply and concealing of factory made epoxy powder coated MS boxes in the wall including Supply and fixing of grid plates, cover plates, hardware, dummy covers, etc. for Installation of the modular switches/sockets. All the modular boxes and cover plate used for switch board shall distinctly carry 'ISI' mark. Non 'ISI' materials / accessories shall not be used.

6.2.21 Conduits: (Item no-32 & 33)

The contractor shall supply and install heavy duty Rigid PVC conduit 25mm and 32mm dia with all required accessories like junction boxes, bends, couplers, covers for JB, saddles, spacers of approved makes as per IS-9357.

All the conduits used for point wiring shall distinctly carry 'ISI' mark. Non 'ISI' conduits / accessories shall not be used. The minimum size of conduit used shall be of 25mm dia unless specified otherwise. Wires of only one phase and neutral shall be drawn and bunched in one conduit. In no case, wires of two different phases shall be accommodated in one conduit. Number of runs of wires to be drawn in each conduit shall be as described at relevant clause (or) as per conduit and wire flow diagram.

In case of surface mounted conduiting, conduits shall be fixed and supported using suitable saddles or spacers along with clamps at intervals not more than one metre. However near to any fitting or accessory used on the conduits, the clamps shall invariably be placed at 300mm. on either side of the fitting / accessories. In case of

recessed conduiting, the interval of clamping shall be one metre or less depending on the routing and bends encountered. Recessed conduits shall have at least 20mm. cover of concrete mixer. G.I. wire of 16 SWG size shall be provided along with the laying of conduit to facilitate drawing of wires on the conduit easily.

The outlet box shall be at least 75mm. deep junction boxes of same make. Suitable measures shall be provided to prevent entry of cement in the conduit pipe during the concreting. The outlet box shall be filled with clay or Hessian cloth so that the concrete does not fill in it. Pull JB's shall be provided at every 5 metre length of conduit wherever the length of conduit (circuit) is more than 5 metre.

All conduits shall be properly jointed using couplers, fitting and accessories. Sufficient number of junction boxes or fittings shall be provided in long runs of conduits for proper pulling of wires. In case of PVC conduits, all joints shall be made using threaded couplers / fittings, or plain couplers / fittings depending on the type of conduits used. In case of plain-ended conduits all joints shall be made using PVC solvent cement or other suitable jointing materials.

Based on the lighting and power layout drawings, separate working drawings showing conduit layouts shall be prepared and got approved from the Engineer in charge. Only on approval of such drawings, the contractor shall take up the works of laying conduits/ drawing of wires.

The size of the conduit shall be appropriate to ensure that the ratio of the occupied area to the conduit area is not more than 50% in line with the relevant IS standards.

Wherever necessary, due to lack of spaces and complexity of cross over points etc, the use of flexible metallic or non-metallic PVC conduits may be made with the approval of ENC. Such use shall be kept to minimum and in no case be considered as alternative to rigid conduiting. Flexible non-metallic PVC conduits conforming to IS: 6916 shall be used along with proper adopter and fittings.

6.2.22 Wires / Cables: (Item no-34)

- All the power & control cables shall be conform to the relevant Indian Standards and necessary test certificates shall be submitted as directed by the Engineer-in-charge.
- All wires used in point wiring shall be FRLHF multistrand flexible copper conductors conforming to IS : 694 and other relevant standards and shall bear 'ISI' mark distinctly.

- 1.5 Sq.mm copper wires (3 runs) shall be used for point wiring for light / fan / 5A plug points
- 2.5 Sq.mm copper wires (3 runs) for circuit mains from DB to switch boards and for switch boards having more than 02 sockets points.
- For 16A socket outlet, 4.0 Sq.mm copper wire shall be used for Phase and Neutral and 2.5 sq mm wire for earth from DB to individual socket.
- While using wires of non-metric sizes, nearest higher sizes of wires / cables shall be chosen, coils or wires shall be got approved by the Engineer in charge prior to uncoiling and drawing in the conduits.
- In case of 20A socket for AC, 4.0 Sq.mm for phase & neutral with 2.5 Sq.mm for earth shall be used.AC point with 230 V, 25A modular type 3 pin power socket, 20/32A, 230V modular type DP MCB control, wiring with two runs of 4 sq.mm (56/0.3) and one run of 2.5Sq.mm (36/0.3) 1100V grade FRLS insulated Copper wire drawn through the existing conduit pipe and connection from PDB to DP MCB and then to socket.
- Storage water Heater shall have a double pole switch (20A) located outside the bath room for switching ON / OFF the heater
- Termination of wires shall be carried out neatly and rigidly with only appropriate amount of insulation peeled off. All wires of size higher than 1.5 Sq.mm shall be terminated using suitable size crimp type terminal lugs. Up to 1.5 Sq.mm wires the ends are preferred to be soldered.
- The contractor shall supply 1.5/ 2.5 / 4 / 6 / 10 sq.mm, 1100V FRLHF insulated multi stranded flexible Copper conductor wire for wiring installations. Colour code of the wire to be used shall be strictly adhered as follows:

Phase : Red, Yellow, and Blue.

Neutral: Black.

Earth : Green
- All the wires in the DB, switch boxes, junction boxes shall be neatly bunched with PVC tag.

6.2.23 Water heaters: (Item no-16)

5 Star BEE rated electrical water heater shall be provided at attached bath room. stainless steel tank, Storage Capacity - 15 litres Water heaters with all accessories including chord wire and plug top, brackets etc, 9 Bar pressure rated, titanium lined element, Capillary Thermal Cut-out, Multi Function Valve, 3cm Thick (PUF) Insulation, Adjustable thermostat with a guarantee for tank-5 years, suitable for operating on 230V AC system. The contractor shall install the heater by suitable size anchor bolt and nuts with washers.

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6.2.24 Lighting fixtures and Fans: (Item no-10 & 11)

- Tube Light fixtures - 230V 4 feet Aluminium extruded Decorative LED light luminaries having minimum 2500 lumens output with efficacy of >100 lm/watt as per data sheet.
- Ceiling fan shall be of 1200 mm (48 inches) sweep 3 blade white / brown colour with Brush Less Direct Current (BLDC) Motor (with remote-2Nos), class of insulation: B, 3 nos. metal (Aluminum alloy) blades, 30 cm long down rod, 2 nos. canopies, shackle kit, safety rope, copper winding, steel/Al body Power Factor not less than 0.9, Service Value (CM/M/W) minimum as below, 350 RPM (tolerance as per IS :374-2019), THD (Total Harmonic Distortion) less than 10%, remote (preferably mobile app based) for speed control and all remaining accessories including safety pin, nut bolts, washers, temperature rise=75 degree C (max.), insulation resistance more than 2 mega ohm, suitable for 230 V, 50 Hz, single phase AC Ceiling Fan compliant to IS 374:2019
- Exhaust fans shall be of heavy duty 300 mm sweep, 2200 RPM / 300mm,1500 RPM with double bearing, with automatic louver shutters or SS mesh to prevent entry of birds, rats etc (Louver/ mesh shall be removable from inside) epoxy powder coated paint ,dynamically balanced blades ,Vacuum impregnated stator winding, ,IP: 55 degree of protection ,Motor with class 'B' insulation
- LED Recessed/ surface Down lighter (Round/ square/ Rectangular) SMD type of following body material with PMMA and prismatic diffuser and construction as per IS :10322 with driver as per the requirement with Driver efficiency >85%,Operating voltage AC 140-270 Volt, frequency 50/60 hz, Operating temp range -15 deg to 40 deg centigrade, internal surge protection of 2.5 KV with Short & Open circuit protection ,THD < 10% , P. F.≥0.95, IP20, CRI >80 , UGR (Unified Glare Rating) < 19, Flicker free (flicker should be below 5%), life time (LED, Driver & electrical circuitry), of minimum 50000 Burning Hours with 70% of initial Lumen maintained till life ends , CCT 3000°K / 4000°K / 5700°K / 6000°K / 6500°K (As per ANSI Bin), SDCM (Standard Deviation Color Matching) <3, Maximum power consumption should not more than the specified rating and Fixture shall be confirming to relevant BIS standards and trade mark certificate (T.C.). Manufactures Word Mark/ Name Engraved/ Embossing/ Screen printing on housing Complete in all respect i/c connections with 1.5 sq mm FRLS, PVC insulated copper conductor single core cable and earthing etc. as required with Minimum 3 year OEM warranty. System lumen efficacy ≥105 and <120 lm/Watt output . LM79 & LM80 Test

report from NABL lab for all testing required for LED fixtures as per BIS shall be submitted. Shape size and CCT shall be as approved by Engineer-in-Charge as per requirement. (Thermal management: heat sink of aluminum housing such that LED

- Mirror light fittings: Aluminium extruded Decorative 1 or 2 feet mirror light LED luminaire having minimum 1150 lumens output with efficacy of >110 lm/watt, all pre wired upto terminal block as per specifications.
- Ceiling /wall mounted bulkhead fitting for outside areas- Weather proof Integrated LED Bulk head luminaries comprises of pressure die cast housing, acrylic diffuser & frame, including all the accessories with IP 65 having 10 W Radar microwave motion sensor LED lights with auto dimming facility within it

The following need s to be checked before installation

- Optimal Visibility: The 60-second off-delay ensures ample visibility even after motion ceases, enhancing safety and convenience.
 - Wide-Area Coverage: The 120 degree wide detection angle ensures movement in almost any direction in the detection range will trigger the light. Ideal for large spaces like parking, staircases, and common corridors.
 - Adaptive Lighting: Automatically brightens to 10 watts when motion is detected and dims to 3 watts when idle, optimizing energy efficiency.
 - Installation height: Recommended installation height is between 2 to 4 meters.
- LED Street light fittings for common areas: LED street light fittings having minimum IP 65, weather proof with minimum 2500 lumens output having efficacy > 110 Lm/W for external / outside areas as per data sheet. 01 meter heavy duty G.I. pipe with accessories to be used for fixing the light fitting
 - LED lamps for house internal common areas: 230V LED bulbs having B-12 base with minimum 600, 1200 lumens as per data sheet

6.3 Rising Main Bus Duct(Item no-12 & 13)

6.3.1 General

The busbar trunking system shall be of low impedance and air insulated type technology. It shall be totally enclosed galvanised steel sheet with Copper Busbars / conductors; suitable for a 3 phase 5 wire 415 volts system with full neutral and continuous internal earth conductor of half size.

250A, Air insulated type Copper busway (3L+N+PE), 100% N, 10KA, crimp closed casing (1mm) made of hot-galvanised sheet steel, pre-lacquered RAL 9001 white, protective conductor (PE) sized $\geq 50\%$ of cross-section of phases and connected to the casing at each junction, Rated insulation & operating voltage is 690V.

The system shall be complete with all necessary fittings, tap-off unit brackets, etc. and tap-off point on both sides of the busbar trunking system. All busbar trunking fittings (elbow, tees, end Cable Tap Box, etc.) shall be IP55 in accordance to IEC 60529 and from the same manufacturer as the busbar trunking system.

The busbar trunking system shall be capable of being mounted in any position without derating. Plug-in and feeder sections shall be interchangeable without the use of special adapter joint covers. The complete installation shall be coordinated throughout and where possible, shall consist of standard 5m, 3m, 2m, 1, 0.5m, sections with special sections and fittings provided to suit the installation. Horizontal runs of busbar trunking system shall be supported by hangers at every 3 meters. Vertical runs of busbar trunking system shall be supported by hangers not more than 4m apart, Busbar trunking system shall be terminated by 'end closure'

6.3.2 Conformity To Standard

It shall be constructed in accordance with the applicable requirements of the latest IEC 60439 Part 1 and Part 2.

Verification of fire barrier in accordance of the latest ISO 60834

Resistance to flame propagation conforming IEC 60332 Part 3.

Resistance of the materials to abnormal heat conforming IEC 60695 Part 2

6.3.3 Environment

The busbar trunking system shall be suitable for continuous operation without derating at an average ambient temperature of 35°C for 24h (40°C maximum peak)

6.3.4 Conductors

Conductors shall be of electrolytic grade copper confirming to latest standards. Live conductors shall be air insulated and supported on fibreglass reinforced polyester isolators, at 250mm intervals.

Full size neutral of the same cross-sectional area as the phase conductor shall be provided for all ratings of the busbar trunking system.

The busbar trunking system shall have the following characteristics:

Rated Insulation Voltage (A/C): 660 Volts

Rated Operating Voltage (A/C): 660 Volts

Frequency : 50Hz

6.3.5 Short Circuit Capacity

The whole busbar trunking system shall be capable of withstanding the short circuit capacity of the electrical installation without damaging the electrical, mechanical and thermal stress under fault condition at a service voltage of 415V 50Hz. Co-ordination of the distribution should be guaranteed such that the Circuit breaker / trunking combination will limit the peak current to a value less than the rated peak current of the busbar trunking.

6.3.6 Temperature Rise

The maximum hot-spot temperature rise at any point of the busbar enclosure at continuous rated load shall not exceed 40° C above the maximum ambient temperature of 50° C in any position, as required by IEC 60439.

6.3.7 Joints

All bus bar joints shall be of tinned / silver plated copper.

Electrical connection shall be via a joint with spring and silver graphite contacts. This joint shall absorb the differential conductor/casing expansion of each length equally.

For ratings from 100A to 400A, the joint shall automatically and simultaneously connect all the live conductors.

The joints shall be so designed as to allow removal of any length without disturbing adjacent lengths.

6.3.8 Enclosure

The metal enclosure of the busbar trunking system shall be of hot dip galvanised steel painted to provide high protection and mechanical resistance for the phase conductors along the entire length.

In order to limit magnetic field around the busbar system, aluminium enclosures are not acceptable.

6.3.9 Tap-Off Outlets

Tap-off outlets on both sides of the trunking shall be at no more than 1m interval. It shall be possible to use them simultaneously.

Tap-off outlets shall be connected to the isolators to form a block, holding the bars. They shall have a shuttered outlet which is opened and closed automatically when tap-off units are plugged in or remove.

Protection level of the tap off outlet shall be at least IP55 by construction.

6.3.10 Tap-off unit

Tap-off units shall be from the same manufacturer as the busbar trunking system and shall be provided with off-load isolator suitable for fuses or circuit breakers according to ratings as indicated in the drawings.

All circuit breakers used shall be able to operate normally when mounted upside down or at any angles. The tap-off units shall also have the provision to mount the earth fault relay together with the breaker. Tap-off units shall be of dust and damp proof version, degree of protection IP 55 with silver plated contacts suitable for all ratings of busbar and shall be suitably earthed.

The earthing contact of the tap-off unit shall always be made before that of the live conductors and the last to break during removal.

The MCCB used in the tap-off unit must comply to IEC 60947-2. All MCCBs shall have a rated service breaking capacity (ICS) of RMS value at 415VAC equal or higher than the prospective fault level of installation. It shall have current limiting capabilities to protect the busbar trunking system and co-ordination table shall be furnished by manufacturer.

The tap-off unit and the busbar trunking system shall be interlocked to ensure that the MCCB is in the 'OFF' position prior to installation or removal of the unit.

The tap-off unit for MCCB shall have an interlock which prevents the cover from being opened while the device is in the 'ON' position and to prevent accidental closing of the device when the cover is opened.

Tap off units for fuses or MCB shall have an isolator. Isolation (AC22 to AC20) shall be achieved by opening the cover of the unit.

Tentative Schedule of bus duct items. However the contractor has to arrange all the materials required to complete the work in full.

Item No.	Description	Quantity for one tower Building
	Note: Schneider Electric make rising main bus duct details given below as a reference	
	Supply, Installation, testing and commissioning of 250A Power Rising main bus ducts - 1 & 2 for D type Blocks along with all accessories as mentioned below. 250A, Air insulated type Copper busway (3L+N+PE), 100% N, 10KA, crimp closed casing (> 0.8 mm) made of hot-galvanised sheet steel, pre-lacquered RAL 7035/9001 white, protective conductor (PE) sized $\geq 50\%$ of cross-section of phases and connected to the casing at each junction, Rated insulation & operating voltage is 690V. The rate quoted shall be inclusive of all components required for completing the rising main job in all respect and as per the detailed specifications given in technical specifications.	
A	RISING MAIN BUS DUCT-250A , Air insulated type Copper busway (3L+N+PE), 100% N, 10KA, crimp closed casing (1mm) made of hot-galvanised sheet steel, pre-lacquered RAL 9001 white, protective conductor (PE) sized $\geq 50\%$ of cross-section of phases and connected to the casing at each junction, Rated insulation & operating voltage is 690V.	
1.	Straight Run with Plug in opening – Model No: KSC25PG	68 mtrs
2.	Flange end – Model No: KSC25FE	2 No's
3.	End feed unit without 250A 4P MCCB, R, Y, B & ON, OFF, TRIP Indication lamps and 2A control MCB	2 No's
4.	End closure - Model No: KSB25FA3	2 No's
5.	Spring Hanger support at every floor - KS01000ZV3	20 No's
	Plug in boxes:-63A TPN Tap off box with provision for 8 Module MCB - Model No: KSB63SM48	22 No's
	Supply, Installation, testing and commissioning of 160A Lighting Rising main bus ducts - 1 & 2 for D type Blocks along with all accessories as mentioned below. 160A, Air insulated type Copper bus way (3L+N+PE), 100% N, 4.1KA, crimp closed casing (> 0.8 mm) made of hot-galvanised sheet steel, pre-lacquered RAL 7035/9001 white, protective conductor (PE) sized $\geq 50\%$ of cross-section of phases and connected to the casing at each junction, Rated insulation & operating voltage is 690V. The rate quoted shall be inclusive of all components required for completing the rising main job in all respect	
B	RISING MAIN BUS DUCT-160A , Air insulated type Copper busway (3L+N+PE), 100% N, 4.1KA, crimp closed casing (1mm) made of hot-	

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	galvanised sheet steel, pre-lacquered RAL 9001 white, protective conductor (PE) sized $\geq 50\%$ of cross-section of phases and connected to the casing at each junction, Rated insulation & operating voltage is 690V.	
1.	Straight Run with Plug in opening - Model No: KSC16PG	68 Mtrs
2.	Flange end - Model No: KSC25FE	2 No's
3.	End feed unit without 250A 4P MCCB, R, Y, B & ON, OFF, TRIP Indication lamps and 2A control MCB	2 No's
4.	End closure - Model No: KSB25FA3	2 No's
5.	Spring Hanger support at every floor - Model No: KS01000ZV3	20 No's
	Plug in boxes:-32A TPN Tap off box with provision for 8 Module MCB - Model No: KSB32CM55	24 No's
C	Supply, Installation, testing and commissioning of common items required for D type Blocks 250A Power Rising main bus ducts and 160A Lighting Rising main bus ducts . The rate quoted shall be inclusive of all components required for completing the job in all respect and as per the drawings	
5.2.1	Single Phase/three phase(for D special and E-type and F-type) smart Energy Meter direct measurement of the Real Energy (kWh) on a single-phase network (92 VAC to 276 VAC) up to $I_{max} = 63$ A. DIN Rail type and shall be of Max Depth of 64 mm when installed on the DIN Rail. E. The meter shall communicate via Modbus RS-485 port with centralized energy monitoring device at the ground floor of each building. The Energy Meter active energy accuracy shall be class 1 conforming to IEC 62053-21 and EN50470-3 - iEM2150 – Model No: A9MEM2150 (item no. 14)	85 No's
5.2.2	63 A DP MCB, Model No: A9N2P63C	50 No's
5.2.3	32 A DP MCB, Model No: A9N2P32C	50 No's
5.2.4	250A 4P 25KA MCCB with Spreader	2 No's
5.2.5	160A 4P 25KA MCCB with Spreader	2 No's

Note: - Above Model numbers given are for reference only.

6.4 Lightning Protection

Supply and installation of Copper, Ø16 mm, 1.5 m high with pointed tip Lightning air terminal (rod)(item no 35.1)

Material

- The lightning termination rod shall be **solid copper, minimum diameter: 16 mm**, and overall length **1500 mm (1.5 m)**.
- Copper shall be electrolytic grade, corrosion-resistant, and conform to IS/IEC requirements for lightning protection conductors.

- Rods shall be free from defects, cleanly finished, and suitable for outdoor installation.
- Rods shall be capable of withstanding expected mechanical loads (wind, handling, vibrations).

Installation

- Termination rods shall be installed vertically at designated locations (e.g., highest structural points per design).
- They shall be securely fixed to the supporting structure using suitable copper clamps/brackets, ensuring electrical continuity with the lightning protection system.

Each rod shall be electrically bonded to the down conductors and earth termination network as per CPWD practices and IS 2309.

Electrical Continuity and Connections

- All connections between rod and conductor shall be low resistance and protected against corrosion.
- Copper strip/wire connections shall match the conductor sizes defined in CPWD tables and relevant IS standards.

Testing & Inspection

- Continuity and resistance of the lightning protection installation shall be tested after erection.
- All works shall meet CPWD electrical earthing and bonding requirements and be tested as per IS/CPWD norms

Supply and installation of Heavy-duty PVC / GI Base mounting for air terminal (item no 35.2)

Heavy Duty GI Base Mounting

- **Material:** Galvanised Iron (GI) of minimum 18 SWG / as per structural requirement, hot-dip galvanised for corrosion protection.
- **Finish:** Galvanised to minimum ISI standards for outdoor corrosion resistance.
- **Design:** Rigid base plate and support fabricated to hold the air terminal rod vertical against wind loads.
- **Fasteners:** GI bolts, nuts, washers and lock nuts suitable for outdoor use; all hardware shall be corrosion-resistant.

Provision for Earth Bonding: Lug or dedicated earth termination point for air terminal, securely connected to earth down conductor.

Heavy Duty PVC Base Mounting

- **Material:** High-impact, UV-stabilised, weather-resistant **PVC (rigid)** or FRP reinforced PVC base suitable for outdoor exposure and mechanical loads.
- **Reinforcement:** PVC base shall be mechanically reinforced with embedded steel/metal plate or encased GI sub-plate for strength and secure bolting.
- **Fasteners:** Stainless steel / GI compatible fasteners with appropriate sealing gaskets to prevent moisture ingress.

Earth Continuity: A dedicated copper/GI bonded earthing lug must be provided on the base for bonding to down conductor.

Design & Mechanical Performance

- Base mounting shall be designed to resist **wind loads and vibration**, in accordance with site wind speed and structural suitability.
- PVC base mountings shall be dimensioned and reinforced sufficiently to ensure stable support of vertical air terminal without cracking or deformation. GI base mountings shall have welded / bolted structural support brackets as applicable.

Installation Requirements

- **Location:** As indicated in drawings or directed by Engineer-in-Charge, ensuring compliance with lightning protection design (rolling sphere / risk assessment).
- Securely fix base mounting on roof / parapet / structural element using approved anchors or chemical anchors where required.
- Ensure vertical alignment of air terminal rod.
- All bolt holes and mounting points shall be adequately sealed against moisture (especially for PVC base).
- Provide earth continuity bonding between mounting base, air terminal rod and down conductors in the lightning protection system.

Testing & Inspection

- After installation, continuity test between air terminal and earth termination system shall be performed and record submitted.
- Ensure firm mechanical fastening without looseness.
- All materials and installation shall be inspected and approved before final acceptance.

Supply and installation of Copper strip 25 × 3 mm for Roof horizontal(item no 35.3)**Conductor**

- a) **Copper strip size:** 25 mm wide × 3 mm thick, **bare electrolytic grade copper** with high conductivity (≥98% IACS or equivalent).
- b) The strip shall be **free from pits, splits, cracks, rust, burrs and surface defects**. The material shall resist corrosion in atmospheric conditions.
- c) Conductor shall be suitable for running **horizontal lightning conductor runs** such as along roof ridges, parapets or edges as part of the air-termination network.

Installation Requirements

- a) **Route:** Horizontal copper strip shall be laid on prescribed alignment (roof ridge or parapet) as per drawing and/or Engineer-in-Charge's instructions.
- b) Strip shall be fixed with **suitable clips/clamps/insulators** at regular intervals not exceeding 1.2 m (or as specified) such that mechanical stability and electrical continuity are ensured.
- c) **Joints:** All joints between strips shall be overlapped with a minimum overlap of 50 mm and fastened with **brass/copper bolted clamps, nuts, washers and spring washers** or made by suitable lugs with proper mechanical and electrical contact.
- d) The copper strip shall be secured in such a way as to minimize corrosion and mechanical damage, and provide continuous low-impedance electrical path.

Bonding and Earthing Connections

- a) The horizontal conductor shall be **electrically bonded to vertical down conductors** at designated points using **approved clamping/accessory** to ensure effective conductivity from air-termination network to earth termination system.
- b) All bonding connections shall be mechanically strong and corrosion-resistant.

Testing and Inspection

- a) After installation, continuity and resistance tests shall be carried out between horizontal strip, vertical down conductors and earth termination network, and results submitted to Engineer-in-Charge.
- b) Fixings and joints will be inspected for mechanical strength and electrical continuity.

Supply and installation of Copper / SS, weatherproof Conductor clamps & fasteners for roof copper conductor clamping(item no 35.4)**Copper Clamps:**

- Made from **high-conductivity electrolytic copper or copper alloy** (e.g., brass) with low resistivity and high corrosion resistance.
- Surfaces shall be smooth, burr-free and suitable for outdoor exposure.
- All copper clamps shall be compatible with the conductor type (strip/wire/tape) and suitable for bonding to copper conductors without causing galvanic corrosion.

Stainless Steel (SS) Clamps:

- Made from **SS 304 grade or better** (SS 316 recommended for coastal/corrosive environments) for mechanical strength and corrosion resistance.
- Fixtures (bolts, nuts, washers) for SS clamps shall be **SS grade** compatible to avoid corrosion potentials

Galvanic Compatibility:

- Where dissimilar metals are used (e.g., copper conductor to SS clamp), appropriate **bimetallic bonding devices or isolation barriers** / conductive coatings shall be provided to prevent galvanic corrosion.

Supply and installation of copper cable 50 Sq.mm(item no 35.5)

- **Size:** 50 sq.mm
- **Conductor:** Electrolytic grade **annealed copper**, stranded
- **Voltage Grade:** 1.1 kV
- **Insulation:**
- PVC insulated (FRLS),
- **Sheath:** PVC outer sheath, black / colour as specified
- **Current Rating:** As per IS standards and manufacturer data
- Cable shall be **ISI marked**, uniform in insulation thickness, free from defects and suitable for indoor/outdoor installation.

Installation Requirements

- Cable shall be laid:
- In **GI / PVC conduit, cable tray, cable trench, or surface/clamped** as specified in drawings/BOQ.
- Proper **bending radius**, spacing and mechanical protection shall be maintained. Cable shall be neatly dressed and securely fixed with **approved clamps/saddles** at suitable intervals.
- Identification ferrules, tags and cable markers shall be provided at both ends

Termination & Jointing

- Cable shall be terminated using **tinned copper lugs** of suitable size, crimped with hydraulic crimping tool.
- Heat-shrink / PVC sleeves shall be provided over terminations.

Earthing & Bonding

- Cable armour (if armoured) shall be **properly earthed** at both ends using copper earth strip/wire as per CPWD & IS 3043.
- Continuity of earthing shall be ensured.

Testing & Commissioning

- After installation, the following tests shall be carried out and recorded:
- Insulation resistance test using 1000 V megger Continuity test

Supply and installation of Copper, bolted type Test link / test clamp (Item no. 35.6)

- **Type:** Bolted type test link (disconnecting link)
- **Material:** High conductivity **electrolytic grade copper** (or copper alloy/brass as approved)
- **Thickness:** Minimum 6 mm (or as specified in BOQ/drawing)
- **Bolts & Nuts:** Copper / brass / SS (compatible and corrosion-resistant)
- **Finish:** Natural copper / tinned copper, smooth, burr-free and suitable for outdoor use
- Test link shall be designed to allow easy disconnection for earth resistance measurement without disturbing the system.

Installation Requirements

- Test link shall be installed at an accessible height (generally 1.0–1.5 m above ground level) or as directed by Engineer-in-Charge.
- It shall be mounted on wall / structure using suitable PVC / GI enclosure or mounting base where required.
- Proper mechanical and electrical connection shall be ensured between:
 - Lightning down conductor and test link
 - Test link and earth conductor / earth electrode
- All joints shall be electrically continuous, mechanically strong and corrosion resistant.

Electrical Performance

- Test link shall provide **low-resistance, low-impedance connection** during normal operation.
- Contact surfaces shall ensure firm pressure and long-term electrical continuity

Testing & Commissioning

- Continuity test between air termination, down conductor and earth termination through test link
- Earth resistance testing after disconnecting the test link
- Visual and mechanical inspection of bolts, contacts and mounting
- All test results shall be recorded and submitted to Engineer-in-Charge

Supply and installation of Copper saddles , at 1 m spacing (Item no.35.7)

- **Type:** Tubular copper earth electrode
- **Outer Diameter:** 17 mm
- **Length:** 3.0 m
- **Material:** High conductivity **electrolytic grade copper**, corrosion resistant
- **Finish:** Smooth, uniform, free from cracks, pits, laminations or manufacturing defects
- **Construction:**
- Bottom end shall be **tapered or pointed** to facilitate driving into the ground
- Top end shall be suitable for **bolted connection** to earth strip/wire

Electrical & Mechanical Characteristics

- Copper shall have **high electrical conductivity** suitable for earthing applications
- Electrode shall be mechanically strong to withstand driving and soil pressure without deformation
- Suitable for long-term underground installation without significant corrosion

Inspection & Acceptance

- Electrodes shall be inspected for correct dimensions, thickness and material quality
- Manufacturer's test certificate / compliance certificate may be demanded by Engineer-in-Charge
- Any electrode found defective or not meeting specification shall be rejected

Supply and installation of Copper bonded rod $\varnothing 17$ mm \times 3 m Earth electrode (Item no.35.8)

Material & Construction Requirements

- Type: Tubular copper earth electrode
- Outer Diameter: 17 mm
- Length: 3.0 m
- Material: High conductivity electrolytic grade copper, corrosion resistant
- Finish: Smooth, uniform, free from cracks, pits, laminations or manufacturing defects
- Construction:
- Bottom end shall be tapered or pointed to facilitate driving into the ground
- Top end shall be suitable for bolted connection to earth strip/wire

Electrical & Mechanical Characteristics

- Copper shall have high electrical conductivity suitable for earthing applications
- Electrode shall be mechanically strong to withstand driving and soil pressure without deformation
- Suitable for long-term underground installation without significant corrosion

Inspection & Acceptance

- Electrodes shall be inspected for correct dimensions, thickness and material quality
- Manufacturer's test certificate / compliance certificate may be demanded by Engineer-in-Charge
- Any electrode found defective or not meeting specification shall be rejected

Supply and installation of Earth pit chamber Heavy-duty concrete / FRP with cover (Item no.35.9)

Precast Concrete Earth Pit Cover

- Material: Precast cement concrete of minimum M-20 grade
- Size: Minimum 300 mm \times 300 mm \times 40 mm (or as specified)
- Reinforcement: Mild steel reinforcement / welded mesh embedded
- Finish: Smooth, durable, weather-resistant
- Marking: Raised or engraved marking "EARTH"

- Frame: Matching concrete / GI / polymer frame where required

Testing & Inspection

- Visual inspection for proper fixing and alignment
- Check for ease of opening and closing
- Ensure durability and stability under normal site conditions
- Approval by Engineer-in-Charge prior to final acceptance

Supply and application of Bentonite /conductivecompound(Item no.35.10)

- Type: Natural bentonite (sodium bentonite) OR proprietary conductive earthing compound (as specified in BOQ)
- Form: Granular / powder / premixed compound suitable for earthing applications
- Properties:
 - High moisture retention
 - Non-corrosive to copper, GI or steel electrodes
 - Chemically stable, non-toxic and environmentally safe
 - Long service life without frequent replenishment
- Packaging: Supplied in sealed bags with manufacturer identification and batch details

Installation / Application Requirements

- Earth pit shall be excavated and earth electrode installed as per drawings and CPWD specifications.
- Bentonite / conductive compound shall be placed uniformly around the earth electrode in layers.
- Minimum thickness of compound around electrode shall be not less than 75 mm (or as specified).
- Compound shall be properly compacted and mixed with water as per manufacturer's instructions to ensure full contact with electrode and surrounding soil.
- Remaining portion of pit shall be backfilled and compacted as directed.

Performance Requirements

- The earthing system shall achieve earth resistance value as specified in tender documents / drawings (generally ≤ 1 ohm or as specified).
- Compound shall maintain low resistance over long periods without degradation

Testing & Commissioning

- Earth resistance shall be measured using approved earth tester after installation and stabilization.
- Test results shall be recorded and submitted to Engineer-in-Charge for approval.
- If required earth resistance is not achieved, additional compound shall be added at no extra cost (unless otherwise specified).

Supply and installation of Copper earth rod clamps (Item no.35.11 &19)

Scope of Work

Providing and fixing copper earth rod clamps for reliable connection between copper-bonded / copper earth electrodes and earth conductors, complete with all accessories, fasteners, testing, and making good, as required for a complete earthing system

Standards & Compliance

- The earth rod clamps shall conform to the latest editions of the following standards:
- IS 3043 – Code of Practice for Earthing
- IEC 62561-1 / IEC 62561-2 – Lightning Protection Components
- BS EN 62561 or equivalent international standard
- CPWD General Specifications for Electrical Works (latest)

Material & Construction

- High-conductivity electrolytic copper / copper alloy
- Minimum copper content: $\geq 99.9\%$ (for solid copper) or equivalent conductivity for copper alloy
- Suitable for direct burial and corrosion-resistant
- Design
- Heavy-duty, bolted type clamp suitable for rod-to-conductor connection
- Compatible with copper-bonded earth rods of diameter 14.2 mm / 17.2 mm / 20 mm
- Suitable for earth conductors of size 25 sq.mm / 35 sq.mm / 50 sq.mm / 70 sq.mm copper
- Provides firm, low-resistance, vibration-proof connection
- Design shall permit easy inspection and tightening
- Bolts & Fasteners
- Copper / brass / silicon bronze bolts, nuts, and washers
- Corrosion-resistant and compatible with clamp material

Electrical Performance

- Low contact resistance ensuring effective earthing
- Withstands fault current without loosening or deformation
- Suitable for lightning and power earthing applications

Installation

- Clamp shall be securely fixed to the earth rod and earth conductor
- All contact surfaces shall be cleaned before tightening
- Bolts shall be tightened to recommended torque to ensure proper contact
- Joint shall be protected with approved anti-corrosive compound / grease after installation
- Installation shall be carried out as per IS 3043 and manufacturer's instructions

Supply and installation of copper cable 16 Sq.mm(item no 35.12)

- Size: 16 [sq.mm](#)
- Conductor: Electrolytic grade annealed copper, stranded
- Voltage Grade: 1.1 kV
- Insulation:
- PVC insulated (FRLS as specified),
- Sheath: PVC outer sheath, black / colour as specified
- Current Rating: As per IS standards and manufacturer data
- Cable shall be ISI marked, uniform in insulation thickness, free from defects and suitable for indoor/outdoor installation.

Installation Requirements

- Cable shall be laid:
- In GI / PVC conduit, cable tray, cable trench, or surface/clamped as specified in drawings/BOQ.
- Proper bending radius, spacing and mechanical protection shall be maintained. Cable shall be neatly dressed and securely fixed with approved clamps/saddles at suitable intervals.
- Identification ferrules, tags and cable markers shall be provided at both ends

Termination & Jointing

- Cable shall be terminated using tinned copper lugs of suitable size, crimped with hydraulic crimping tool.
- Heat-shrink / PVC sleeves shall be provided over terminations.

Earthing & Bonding

- Cable armour (if armoured) shall be properly earthed **at** both ends using copper earth strip/wire as per CPWD & IS 3043.
- Continuity of earthing shall be ensured

Testing & Commissioning

- After installation, the following tests shall be carried out and recorded:
- Insulation resistance test using 1000 V megger Continuity test

Supply and installation of Copper / brass bonding clamps (Item no.35.13)

The bonding clamps shall comply with the latest editions of:

- IS 3043 – Code of Practice for Earthing
- IEC 62561 (Part 1 & 2) – Lightning Protection Components
- BS EN 62561 or equivalent
- CPWD General Specifications for Electrical Works (latest)

Clamp Material

- Electrolytic copper or high-grade brass
- Corrosion-resistant and suitable for indoor, outdoor, and direct burial applications
- Minimum conductivity equivalent to relevant IEC standards

Design

- Heavy-duty bolted type bonding clamp
- Suitable for conductor sizes: 16 [sq.mm](#) to 70 [sq.mm](#) copper (or as specified)

Suitable for bonding to:

- Round conductors / strips
- GI / MS pipes
- Structural steel sections
- Cable trays and metallic enclosures
- Provides firm mechanical grip and low-resistance electrical contact
- Design shall permit easy inspection and maintenance

Fasteners

- Copper / brass / silicon bronze bolts, nuts, and washers
- Anti-loosening and corrosion-resistant

Electrical & Mechanical Performance

- Low contact resistance ensuring effective bonding
- Withstands fault current and lightning impulse without loosening
- Mechanically strong to withstand vibration and thermal stresses

Installation

- All contact surfaces shall be cleaned before fixing
- Clamp shall be securely tightened using proper tools to achieve reliable contact
- Joint shall be protected with approved anti-corrosive compound / petroleum jelly / suitable protective coating
- Installation shall conform to **IS 3043**, IEC guidelines, and manufacturer's instructions

Supply and installation of 3-phase, 50 kA minimum Type 1+2 SPD (Item 35.14)**Technical Specifications**

- Type: Combined Type 1 + Type 2 SPD
- System: 3-Phase + Neutral (3P+N)
- Rated Operating Voltage (Uc): ≥ 275 V AC (L-N), suitable for 415 V systems
- Impulse Current (Iimp): Minimum 50 kA (10/350 μ s) per phase
- Nominal Discharge Current (In): ≥ 20 kA (8/20 μ s)
- Maximum Discharge Current (Imax): ≥ 50 kA (8/20 μ s)
- Protection Level (Up): ≤ 1.5 kV
- Construction: Aluminium alloy enclosure / aluminium-based surge modules with flame-retardant, self-extinguishing housing
- Modules: Plug-in, replaceable type with mechanical disconnection
- Status Indication: Visual indicator (green/red) for each phase
- Remote Signalling Contact: Potential-free changeover contact (optional / as specified)
- Response Time: ≤ 25 ns
- Degree of Protection: Minimum IP20 (IP54 if outdoor panel)
- Operating Temperature: -40°C to $+80^{\circ}\text{C}$

Installation Requirements

- SPD shall be installed inside main LT panel / incomer panel on DIN rail or suitable mounting arrangement.
- Connection shall be made using shortest possible copper conductors (minimum 16 sqmm Cu or as per manufacturer recommendation).
- Proper coordination with upstream and downstream protection devices shall be ensured.
- SPD shall be connected to dedicated earth bar, which in turn is bonded to the main earth grid.
- Necessary MCB / fuse backup shall be provided as per manufacturer guidelines.

Standards & Compliance

- IEC / EN 61643-11
- IEC 62305 (Lightning Protection)
- IS / CPWD Electrical Specifications (Latest) Testing & Commissioning
- Verification of correct installation and connections
- Checking of visual status indicators
- Functional testing and recording of parameters
- Submission of test reports and manufacturer's datasheets

Supply and installation of Type 2 SPD Distribution board protection (Item 35.15)

- Technical Specifications
 - Type: Type-2 SPD (Class II)
 - System: 3-Phase + Neutral (3P+N) / Single Phase (1P+N) as specified
 - Rated Operating Voltage (Uc):
 - 275 V AC (L-N) for 230/415 V systems
- Nominal Discharge Current (In): Minimum 20 kA (8/20 μ s) per pole
- Maximum Discharge Current (Imax): Minimum 40 kA (8/20 μ s) per pole
- Voltage Protection Level (Up): ≤ 1.5 kV
- Construction: High-quality thermoplastic / aluminium-based surge modules with flame-retardant, self-extinguishing enclosure
- Modules: Plug-in, replaceable type with thermal disconnecter
- Status Indication: Visual indication (healthy/faulty) for each pole
- Remote Signalling Contact: Potential-free changeover contact (optional / as specified)
- Response Time: ≤ 25 ns
- Degree of Protection: Minimum IP20
- Operating Temperature: -40°C to $+80^{\circ}\text{C}$

Installation Requirements

- SPD shall be installed inside distribution board / sub-distribution board on DIN rail.
- Interconnecting conductors shall be short and straight, using minimum 10 sqmm copper or as per manufacturer's recommendation.
- Proper MCB / fuse backup protection shall be provided upstream of SPD.
- SPD shall be connected to a dedicated earth bar, bonded to the building earthing system.
- Total connecting lead length (L+N+PE) shall preferably not exceed 0.5 m

Standards & Compliance

- IEC / EN 61643-11
- IEC 62305 (Lightning Protection)
- IS / CPWD General Electrical Specifications (Latest) Testing & Commissioning
- Checking of connections and tightening
- Verification of visual indication
- Functional testing
- Submission of test report and manufacturer's datasheets

6.5 "External electrification works

- Panels
- LT cables
- Jointing kits for Cables
- Street light system
- Structural steel materials

However, the equipment shall conform to all aspects of engineering, design and workmanship as per the corresponding standards. It shall be capable of performing continuous commercial operation in a manner acceptable to the PURCHASER, who will interpret the meaning of specifications and drawings. The Purchaser that is NPCIL shall be entitled to reject any work or material, which in his judgment, if it is not in accordance with the intent of this specification.

6.5.1 APPLICABLE CODES AND STANDARDS:

The work shall be carried out in the best workmanlike manner, in conformity with this specification, Installation Standards and the relevant specifications / codes of practice of the Bureau of Indian Standards.

It shall be ensured that the installation conforms to the requirements of the following Table-1 BIS / International standards but not limited to:

TABLE

1.	Specification for Low-voltage Switchgear and Control gear	IS/IEC 60947 and IS 13947
2.	Distribution Boards	IS 2675
3.	XLPE cables (Working Voltage up to and including 1100V)	IS 7098 part-1
4.	Watertight electric lighting fittings	IS 3553
5.	Boxes for enclosure of electrical accessories	IS 5133
6.	Earthing	IS 3043
7.	Current Transformer	IS 2705
8.	Indicating Instruments	IS 1248
9.	Electrical relays	IS-3231 and 3842
10.	Low Voltage fuse	IS-13703-2-2 / IEC 269-2-1
11.	A.C. electricity meters	IS-722 & BS-5685
12.	Wrought aluminium and Aluminium alloy bars, rods, tubes and sections for electrical purposes.	IS-5082
13.	General requirement for switchgear and control gear for voltage not exceeding 1000 volts	IS-4237 / IEC-60439/60947
14.	Dimensions for panel mounted indicating and recording electrical instrument	IS-2419
15.	Marking and arrangement for switchgear, bus bars, main connection and auxiliary wiring.	IS-375
16.	Recommended current rating for PVC insulating and PVC sheathed heavy duty cables.	IS 3961
17.	Conductor for insulated electric cables and flexible chords.	IS 8130
18.	PVC insulating and sheath of electrical cables.	IS 5831
19.	Mild steel wires, strips and tapes for armouring of cables.	IS 3975
20.	Compression type tubular terminal ends for Aluminium conductors of insulated cables	IS 8309
21.	Methods of Test for Cables	IS 10810
22.	Brass Cable glands	IS 12943
23.	Unsaturated Polyester Resin systems for Low Pressure Fibre Reinforced Plastics	IS 6746 – 1994

National Building Code, regulations laid down by CEA/Electrical Inspectorate and any other regulations enforced by central/state/local authorities and Insurance agencies shall also be applicable.

6.5.2 MATERIALS AND WORKMANSHIP:

All the materials, equipment, fittings and other accessories to be supplied by the contractor shall be new, unused and best quality conforming to the specifications. They shall be manufactured in accordance with the latest version of the specifications of Bureau of Indian Standards / International standards. If the equipment with specified specification is not available the contractor shall get the approval from Engineer-in-Charge before supply & installation.

The offered equipment shall be brand new with state-of-the-art technology and should have proven field track record. No prototype equipment shall be offered and will not be accepted.

6.5.3 SITE CONDITIONS:

All the materials / installations shall be suitable for operating satisfactorily in a tropical, humid and corrosive saline atmosphere. For details regarding the site weather condition, see section III, Special conditions of contract.

6.5.4 GENERAL FUNCTION AND DESCRIPTION:

Design, supply, installation, testing and commissioning of the equipment and associated works shall be as per the schedule of quantities, technical specifications and conform to relevant Indian & International Codes, Standards and IES Hand Book. The design of the equipment shall meet the standard safety requirements along with ease in operation & maintenance.

Contractor shall prepare detailed drawings and layouts based on the requirements specified in this Technical Specification and other referred documents/ drawings attached in the tender.

6.5.5 GENERAL - REQUIREMENTS:

All rates quoted shall be inclusive of all sundry materials like hardware, clamps, cleats, nuts and bolts, cement and sand, solders, fluxes, paints including all consumables like electrodes, gases and consumables etc as per the specifications.

All the cable entries shall be through bottom of the panels to the extent possible. All the unused cable entries shall be plugged off with suitable blanking plugs / plates.

Security of the materials, insurance, preservation till handing over etc. for the materials issued shall be of the contractor's responsibility.

The contractor shall have adequate and proper testing equipment, tools and tackles required for execution of job. If it is found insufficient, the same has to be arranged by the contractor.

Wherever required, chase cutting in wall, making hole, closing / finishing the cable trench entries to the substation / buildings / tunnels / trench using bricks and plastering etc. shall be done by the contractor. Final touch up painting shall be carried out by the contractor. On completion of job, all the wooden crates, small pieces of cable, wires, armour wires, other generated waste etc. shall be removed by the contractor.

The quantities covered in the schedule of work are tentative and may vary to suit site requirement. Quantity of materials to be supplied / purchased shall be assessed by the contractor and got approved from EIC before supplying the materials.

The manufacturer of the supply materials / equipment shall be as per the approved list. If the vendor is not from the approved list, prior approval has to be taken from Engineer-in-charge.

All the materials supplied and works executed by the contractor shall be guaranteed for twelve months from the date of completion of the work order.

Empty cable drums and other non returnable scrap materials shall be removed from site and deposited as per the guidance of EIC.

6.5.6 TECHNICAL REQUIREMENTS: CABLES:

6.5.7 Scope:

Scope includes assessment of quantity of each cables as per site conditions, preparation and approval of quantities, testing, transportation to site, unloading, preparation & finalization of erection /cable laying procedures, field quality plans and check lists prior to installation works, laying, glanding, termination, testing and commissioning etc as per SOQR, specifications and relevant standards. (Cable supply is NPCIL Scope)

6.5.8 General:

Laying, jointing, terminating, testing and commissioning of LV XLPE insulated, Aluminium / Copper conductor cables, cores laid-up with Polypropylene central filler and tape, extruded PVC inner sheathed, GI wire/strip armoured and PVC outer sheathed overall confirming to IS 7098 Part-I with latest amendments and specifications given below. Cables are to be laid in trenches / clamped directly to wall / structures or directly buried underground as per instructions.

6.5.9 Laying of Cables: (Item no-27)

The scope of cable laying includes shifting of cable to location, pulling the cable, laying, proper dressing of cables on cable pans ,supply and installation of cable fixing elements like saddles, spacers, Aluminium strips and cable tags etc as per IS: 1255.

Installation of cables shall be carried out generally as per IS: 1255. The cables shall be laid in trenches, racks, tunnels, conduits, Hume-pipes or directly clamped as specified

and directed by Engineer in-charge. Power and control cables shall be laid in separate cable trench. Where groups of LV and control cables are to be laid in a same route, both shall be separated physically and dressed properly. Wherever cable crosses the roads, water, oil, gas or sewage pipe lines, it shall be laid in reinforced spun concrete or steel pipes. For road crossings the pipe for the cable shall be buried at not less than one-meter depth.

When power cables are laid in the proximity of communication cables, minimum horizontal and vertical separation between them shall be maintained. Power and communication cable shall cross at right angles to each other, as far as possible.

During cable lugging / termination, the exposed portion of the lug shall be covered with insulation sleeves / silicone tape. All wall openings/pipe sleeves shall be sealed effectively after installation of cables to avoid seepage of water. Where ever cable trenches are not available, cables shall be clamped on walls, ceilings, columns, structure, etc before they are connected to equipment terminals, as per the instruction from Engineer in Charge to meet the site requirement. Cables shall be protected at all times from mechanical injury and from absorption of moisture at unprotected ends. Cables shall be replaced at Contractor's own expense in case of any damage due to negligence by the contractor.

Cable laying shall be started only after ensuring the following activities

- IR value of the cable is taken and clearance obtained from NPCIL representative.
- Cable drum has been moved to appropriate location and mounted on the spindle with the help of Jacks of proper capacity in both sides.
- Enough cable straight rollers and corner rollers are placed in the trench / route.
- Required man power with all other arrangements is made available.

The cable drums shall be unrolled in the direction of the arrow marked on the drum for unrolling. Cables shall be protected against damages due to edges of pans, racks, conduits or their supports upon entering or leaving pans or conduits. Cables in pans shall be clamped by 25 x 3 mm Aluminium strips (to the cable pans) at a distance of 10 mtr. Sequence of cables transversely in pans shall avoid unnecessary crossing of other cables when some of the cables make turns into lateral pans or enter or leave a run of pan. From panels/motors, cables shall be laid in pans with allowance for angles, offsets and branches. Cables shall then be restrained temporarily in an approved manner on one side of each angle, branch or offset in turn. Cables shall be formed to the change in pan direction so that the finished cable will lie flat, straight without restraint and without looping out of pans along straight runs of pans, on any change of direction.

Contractor shall plan the sequence of cable laying in such a way to avoid crisscrossing of cables or jumping over the other cables, while taking out from main run. Taking cables in/out through bottom of the pans is not acceptable generally. Efforts shall be made to ensure the availability of all the cables before laying in a particular route as a part of good cabling practice. Care shall be taken during the cables laying to avoid formation of twist, sharp bend, braiding, crisscrossing etc in order to avoid damages to cables.

Scrap/waste generated from cabling shall be duly disposed of regularly and the area shall be maintained neat and clean.

At cable bends the minimum-bending radius shall not be less than 15 times the diameter of the cable or as per the manufacturer's instructions. Aluminium strip Cable tag having cable size with source and load details shall be provided at starting & end point of the terminations and along the cable wherever required (50 mtr span) as per the direction of engineer in Charge. Before cutting the cable for laying, the laying length shall be surveyed thoroughly and then required length should be cut for laying.

6.5.10 OUTDOOR TRENCHES:

Cables shall be laid in outdoor trenches as per the requirement. The depth of the trenches shall not be less than 750 mm for LV cable from the final ground level. The width of the trenches/tunnels shall be at least 300 mm. However, where more than one cable is laid in a single trench, coaxial distance as per the IS shall be allowed between the cables. The trenches shall be cut square with vertical sidewalls and with uniform depth. Suitable shoring and propping may be done to avoid caving-in of trench walls. The floor of the trench shall be rammed level. The cables shall be pulled in trenches over rollers placed inside the trench.

Cable shall be laid on a bed of crusher sand and covered by bricks on three sides. The contractor shall supply good quality crusher sand and spread the same above and below the cables to a thickness of 100mm after laying cables in the excavated trench along the cable route. Contractor shall supply good quality standard size (225mmX115mmX75mm) bricks / fly ash bricks as per specifications to cover the cables along its route (approx. 18 bricks per meter). The trench shall be refilled, compacted, leveled etc with the excavated soil as directed by the Engineer-in-charge. Proper cable route markers shall be installed along the routes in outdoor areas.

Wherever readymade permanent cable trenches are available, the scope includes removal of concrete covers / slab and clean the soil / sand if present then laying the cable as mentioned above without sand and bricks. After completing the cable laying process, restore the slabs to its original condition without any additional charges.

6.5.11 INDOOR AREAS:

The cables in indoor area / trenches shall be laid on cable trays wherever it has been installed and clamped to trays using Aluminium clamp of 25 x 3 mm and by nylon tie at an interval of 5 meters alternatively in horizontal run. In vertical run, it shall be clamped at every meter. Near cable tray bends and equipment termination, it shall be clamped at a distance of not more than 300 mm from the equipment. Supply of all the hardware and Aluminium clamps / nylon ties required for cable clamping is in the scope of contractor. All hardware shall be galvanized or zinc passivated.

Where ever cable trenches are not available, cables shall be clamped on either wall or ceiling using heavy duty GI saddles, spacer, Lead rawl plug and clamps with spacing not more than 500mm. Wherever necessary, the use of cable-trays and hangers etc shall be made as directed. In every run of cables, some extra length shall be kept at suitable points to enable a joint to be made later. Where ever cables are crossing through brick walls, floors, ceiling or RCC walls, it has to be laid in rigid metallic or non-metallic heavy duty PVC conduit pipe sleeve / HDPE / Hume pipes of higher size for easy / smooth passage of cables.

Wastage and scrap cables should not exceed the value specified in GCC.

6.5.12 GLANDING AND TERMINATION OF CABLES: (Item no-21)

Glanding of the cables in panels / JB's / DB's shall be done with nickel plated double compression type brass cable glands as mentioned in SOQ and of approved makes.

Cable glands shall be weatherproof, suiting to the cable dimensions, taking care of tolerances. Various components like rubber ring, metallic ring, metallic cone and the outer / inner nuts, etc. shall be capable of adjusting to the indicated tolerances of cable dimensions. Termination of the cables shall be done with proper size of crimping type ring / pin type terminal lugs as per the schedule/ site requirement.

Cables shall be properly supported / dressed after termination as per the requirement. Termination of the cables shall be done in panels / JB's / Lighting fixtures using appropriate type of lugs. Copper cables shall be terminated with copper lugs. Cable terminals shall bear ferrules with circuit details wherever applicable. Exposed portion of the lug shall be covered with insulation sleeves / silicone tape. Ordinary insulating tapes are not permitted for the same.

6.5.13 JOINTING OF CABLES: (Item no-20)

The Contractor shall take care to see that all the cables received at site are apportioned to various locations in such a manner as to ensure maximum utilization and avoidance of cable jointing. This apportioning shall be approved by the ENC before cutting the cables.

Where joints are unavoidable, prior approval shall be taken from ENC for location of such joints and marking shall be done with suitable tags

LV cable jointing shall be done with heat shrinkable kit of approved makes. All the cable joint works shall be executed strictly as per the kit manufacturer's instructions and in an approved manner by a qualified person. Cores of cables shall be jointed color to color (should not be different colors) and tested for continuity. The insulation resistance value shall be checked before and after jointing works. The seals of cables must not be removed before the completion of preparatory works for jointing. Joints shall be commenced and finished on the same day. During the time of joining the cables, sufficient protection from the weather / dust shall be provided.

All the new cables shall be checked by Insulation tester before and after joining works. L.V cables of 1100 volt grade shall be tested by 1000 Volt.

Cable cores shall be tested for continuity, insulation resistance between phases / earth/ neutral and ensured the absence of crow phasing. Contractor shall furnish all testing kit and instruments required for field-testing.

Check list shall be cleared from NPCIL representative before starting the jointing works.

6.5.14 CABLE ROUTE MARKER

Supply and installation of cable route marker of 100 mm x 100 mm x 5 mm GI / CI with engraving as per Technical specifications, fixed on ISA 35x35x6 mm- 750 mm long, preparation of PCC cube of 250 mm x250mm x 250 mm with 1:2:4 concrete, curing, cleaning, application of primer, red color enamel paint on metal parts and white color paint on engraving, shifting to location and install above the cable route by excavating 250 mm deep.

6.5.15 EARTHING:

6.5.16 SCOPE:

Supply, fabrication, installation, testing and commissioning of earthing system including construction of earth pits, earth grid etc. which confirms IS: 3043 and specifications. The scope includes all related civil work for making pit, providing suitable covers and painting identification marks etc.

6.5.17 GENERAL:

All the non-current carrying metal parts of electrical installation shall be earthed as per IS: 3043. All the equipment, looping JB's, street light poles, metal conduits, cable armour, switch gear, distribution boards, meters, cable glands and all other metal parts forming part of the work shall be bonded together and connected by two separate and distinct conductors specified in this specification to earth electrodes.

6.5.18 EARTH RODS AND CONDUCTORS:

The Earth Rod shall be made up of corrosion resistant copper rod not less than 5/8inch diameter and length of not less than 10 feet. Earth rod should be molecularly bonded with copper to high strength steel cores with nickel interface. The minimum copper bonding thickness should be of 250 micron and shall be as per UL467 standard. Natural / eco-friendly moisture enhancer shall be filled around the rod using highly hygroscopic, electrically conductive (GEM)-minimum 20 Kgs ground enhancement material confirming to IEC 62651-7 and required earth rod clamps for terminal connections. All the necessary materials including copper bolt and nuts / stainless bolt and nut / clamps etc for connecting earth conductor etc is in the scope of contractor.

Excavation of earth pit, filling with eco-friendly backfill compound (GEM), providing necessary concreting & brickwork and casting, placing of slab all as per IS 3043 standard. It is contractor's scope to supply, install and test all the equipment, hardware etc to complete the work in all respect as per the IEEE / IS requirements and submit the test reports.

The connection of earth electrodes shall be strong, secure and sound. It shall be easily accessible. The earth conductors shall be rigidly fixed to the walls, cable trenches, cable tunnel conduits and cables by using suitable clamps.

Earth connection between earth strip and equipment shall be done with suitable flexible copper conductor with lugs, bolts, washers and nuts. Panel earth can be directly welded / bolted to GI strip as per provision / manufacture's instruction. The electrical resistance of earth conductors shall be low enough to permit the passage of fault current which is necessary to operate the fuse/protective devices and Circuit Breakers.

The grounding system resistance shall not exceed 5 ohms.

6.5.19 MAIN POWER PANELS: (Item no-24)

The scope include design, engineering, manufacture, inspection, testing at manufacturer's works, transportation and delivery to site, testing and commissioning of floor mounted indoor type Main panels with associated accessories. Panels shall be installed at new residential buildings as per the requirements. It shall be suitable of 415 / 230V AC 3 phase, 4 Wire distribution systems.

Panels shall be supplied as per the approved Single Line Diagram (SLD) drawings and specifications.

Makes of all components shall be “as per the approved Vendor List”. Whether called for specifically or not, all the accessories required for normal operation of equipment are deemed to be considered as a part of the contractor's scope of supply. Detailed engineering drawing, SLD and technical data sheet shall be prepared and got approved before fabrication of panels.

6.5.20 SPECIFIC REQUIREMENTS:

The LT Panels / Low voltage Switchgear shall be metal enclosed Form 3B type suitable for indoor floor mounted installation having minimum size of 1000mm (L) x 1475mm (H) x 350mm (D).

1. The panels shall be in accordance with IEC 61439-1&2, IP > 42.
2. Cable entry is from Bottom.
3. The bus bars system shall be of Tinned Copper with heat shrinkable insulating sleeves.
4. The bus bars shall be provided with complete metal shrouding for all live bus bars to prevent accidental touch. The joints shall be of bare bolts and not insulated.
5. The maximum temperature of bus bars and devices shall be as per IEC standards.
6. Minimum clearance between the bus-bars shall be as per IEC standards.
7. MCCB, MCB and other devices ratings are considered at free air ambient temperature. De-rating factor is not considered for the same.
8. Multifunction meter shall be of digital type with inbuilt selector switches. It should display current and voltage values
9. Phase indicating LED lamps shall be provided in the incomers.

6.5.21 CONSTRUCTIONAL FEATURES:

The incomer MCCB shall be as per SOQ with handle and Spreader features. Phase Indication LED lamps with control MCB and three phase multifunction digital meter with CTs shall be provided for incomer. 1P, 2A Control MCB shall be provided for the control circuit. Outgoing MCCB shall be as per SOQ along with handle and Spreader features.

Clustered LED type indicating lamp with minimum 8mm diameter size shall be provided for indications. LEDs shall be of the same colour as that of the lamp covers. Lamps shall be provided with series resistors, lamp holders and covers.

All the doors shall be provided with non-combustible flame-retardant neoprene rubber gaskets all around. Louvers shall have screens / perforated sheets.

Instruments and control devices shall be flush mounted on the hinged door. Panel door shall be supported by strong hinges and braced to ensure freedom from sagging, bending and general distortion of panel or hinged parts. Hinged parts shall have latching facility at two places. The hinges on panel doors shall not experience excessive loads due to the equipment on the doors and during closing and opening of the door.

Panel enclosure shall be made up of CRCA sheet steel having minimum thickness of 2 mm for load bearing and 1.6mm for non-load bearing members, epoxy powder coated after 7 tank process. Cable compartments shall be fitted with removable undrilled plates of 3mm thick at bottom for cable entry to the cubicle using cable glands so that holes can be made at site as per requirement.

6.5.22 BUS-BARS:

The bus bars shall be made of high conductivity, high strength 99.9% pure Electrolytic grade Copper conductor. Bus-bars shall have uniform current density throughout their length. It shall be tinned and insulated with heat shrinkable PVC sleeves of corresponding colour code. The size of the main bus bars and feeders shall be as per SOQ. Feeders shall be provided with bus bars for termination of external cables. Shrouding for all live bus bars to prevent accidental touch and it shall be suitably braced with non-hygroscopic SMC supports. Ridges shall be provided on the SMC supports to prevent tracking between adjacent bus bars. The size of the neutral bus bar shall be same as the phase bus bars. The earth bar and neutral bus bar shall be designed to withstand against the stress caused due to electrical fault. Only zinc passivated or cadmium plated high tensile strength steel bolts, nuts and washers shall be used for all the bus bar joints and supports.

Large clearances and creepage distances shall be provided on the bus bars system to minimize the possibility of a fault. Connections from the main bus bars to functional circuits shall be arranged and supported so that it can withstand without any damage or deformation due to thermal and dynamic stresses caused by over currents. Removable neutral links shall be provided on feeders to permit isolation of the neutral bus bar.

Red, yellow and blue colour shall be used for Phase bus-bars and Black colour shall be used for neutral bus bars. Each bus bar shall be fully insulated. The terminal design of the bus bar shall be based on installation of the switchgear in poorly ventilated condition. The design shall consider the volume of cooling air in the bus bar compartment only and not the total volume of vertical compartments. The maximum operating temperature of bus bars shall not exceed 85 Deg. C for normal condition and 250 Deg. C for short circuit condition.

6.5.23 INSTRUMENT TRANSFORMERS:

Current transformers shall have class E or better insulation. They shall be able to withstand the thermal and mechanical stresses resulting from over currents. The winding shall be of

Kudankulam Nuclear Power Project	Construction of 203 Nos of Residential Quarters comprising of 40 Nos of E-type (G+10 floor-1 Tower), 80 Nos of D-Special quarters (G+10 floor-2 Tower), 80 Nos of B-type quarters (G+10 floor-2 Tower) and 3 Nos of F Type quarters (G+1 floor) at Anuvijay Township
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copper conductor. The polarity shall be indicated on both primary and secondary terminals and also on the associated terminal blocks. They shall be mounted on the stationary part of the panel. Proper access to each set of CTs shall be provided for repair/ maintenance.

The CTs shall be of Class 1 accuracy with 2.5 VA burden. CTs for instruments shall have an accuracy limit factor less than 5.0. One leg of the CTs shall be earthed. All the measuring instruments shall be of 144 x 144 Sq.mm (or) 96 x 96 sq.mm patterns, flush mounting. Current transformers shall conform to IS: 2705 / IEC60044.

6.5.24 TECHNICAL DATA SHEET FOR MAIN PANEL:

Sl. No	Item description	Specifications / Rating	Qty	Make
1.	Tinned copper Bus bars	Electrolytic grade insulated Copper 30 mm x 06 mm for Phases and Neutral. 25 mm x 03 mm for Earth.	As required	Material LAB test certificate.
2.	Incomer MCCB with spreader	250A, TM based, 36 kA	1 No	L&T / Schneider / Legrand / Siemens / BCH
3.	Outgoing MCCB with spreader	160A , TM based, 25 KA	2 Nos	L&T / Schneider / Legrand / Siemens / BCH
4.	LED lamps	Cluster type LED, 230V	3 No's	L&T (ESBEE) / Schneider/ C&S / Selzer / BCH
5.	Control MCB	2A, 1P Control MCB	3 No's	L&T / Schneider / Legrand / Siemens /
6.	Multifunction meter	Digital type, CI 1.0, Input voltage-50-500VAC, CT secondary selectable-1-5A, CT/PT shall be site programmable. Parameters- VLL,VLN, A, F, PF	3 No	L&T / Schneider/ C&S / Selzer / BCH
7.	Current transformers	250/5A	3 No's	Kappa / Jyothi / Pragati

6.5.25 CUBICLE WIRING & TERMINATION:

Cubicles shall be supplied complete with internal wiring up to outgoing cable chamber /terminal blocks and it shall be ready for external cable connections. All internal wiring shall be carried out with 1100 V grade FRLS insulated, single core, multi stranded copper conductor wires. Wire bundles shall be supported at every interval by clamps, straps, tees, wire ducts etc. Control wires shall be terminated using pin type / ring type copper lugs of

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proper size. The minimum sizes of the stranded copper conductor used for panel wiring shall be as follows:

All control circuits except CT circuits	1.5 sq mm
CT circuit lead	2.5sq mm

Current signal wires are to be connected through link type TBs so that checking / testing can be done without removing the wires. Shorting links shall be provided for all CT terminals. The colour of the wires shall be as given below:

Circuit voltage	Color of wire
CT circuit R-phase	Red
CT circuit Y-phase	Yellow
CT circuit B-phase	Blue
240 V AC phase	White
All Neutrals	Black
All Earthing	Green
Control wires/ wiring of all spare contacts	Grey

6.5.26 PAINTING:

After completion of fabrication, all steel work shall undergo seven tank processes as per IS-6005 that is degreasing, rinsing, de-rusting, phosphate treatment, chromate passivation, undercoat and painting etc. After preparation of the under surface, the panels shall be spray painted with two coats of epoxy based final paint or shall be powder coated. Colour shade of final paint shall be as per IS 631 / RAL 7032. The final finished thickness of paint film on steel shall not be less than 80 microns, and shall not be more than 100 microns. At each coat thickness of paint shall be measured. Painting shall not peel off, scratch resistant and shall provide corrosion protection for metallic surfaces.

The finished panels shall be dried in staving ovens in dust free atmosphere. Panel finish shall be free from imperfections like pinholes, orange peels, runoff paint etc. Final touch up may be done at site for any damages occurred to the painting during the transportation, erection etc.

All unpainted steel parts shall be cadmium plated or suitably treated as per the relevant standards to prevent rust formation. If these parts are moving elements then they shall be greased and lubricated properly. Finished painted appearance of equipment shall present an aesthetically pleasant appearance, free from dents and uneven surface.

6.5.27 PANEL EARTHING:

The earth bus shall have sufficient cross section to carry the momentary short circuit current with fault duration of 1 second, without exceeding temperature of 250 deg. C and it should run throughout the length of panel extended to outside at both ends for external earth connections. Hinged doors shall be earthed through flexible braided copper earth conductor.

All metallic cases, instruments and other cubicle mounted equipment shall be connected to the earth bus by copper wires of size not less than 2.5 sq. mm. The colour code for the earth wire shall be green. Earth wire shall be connected on terminals with suitable clamp connector; soldering will not be permitted. Looping of earth connections shall not be permitted to avoid loss of earth connection to other devices when the loop is broken. However, looping of earth connection between equipment to provide alternate path to the earth bus shall be allowed.

Provision shall be made to connect the earth bus bar to the earth grid at two ends. The earth bus shall bring back to the cable compartment and earth bolts shall be used to ground the cable armour. The mating surfaces of all bolted parts shall be zinc passivated to ensure continuity between them.

6.5.28 INSPECTION:

Panels shall be inspected by the client representative at manufactures premises / get shipping clearance before despatching to site.

6.5.29 INSTALLATION:

The panel shall be handled with care, avoiding any impact to be the equipment.

The panel shall not be unpacked till its erection other than for inspection. Proper level of base frame shall be maintained throughout its entire length and shall be ensured with water level/spirit level instruments. Steel shims shall be provided below base frame wherever required to achieve even surface. No new hole shall be drilled

Fixing of Panels shall be done by bolting / welding with base-frame of minimum 100mm (ISMC100) height which in turn welded to the embedded plates provided in the floor. Foundation base frames shall be provided with the holes to match with panel installation at site by bolting. Each panel shall have a name plate with details engraved on the front side. Panel shall be checked for its correct vertical position using plumb line & spirit levels. All the components of the panel shall be visually inspected for the damages during the installation.

6.5.30 TEST CERTIFICATES:

Routine test reports as per standards shall be provided.

6.5.31 TEST AT SITE:

PANELS:

The following tests shall be conducted at site on panel.

PRELIMINARY CHECKS:

- a) Checking the physical damages
- b) Checking of nameplate details of all the equipment according to specification and verification of bill of materials.
- c) Checking of cleanliness.
- d) Confirming the maker of components.
- e) Checking of tightness of bolts, clamps, wiring and connecting terminals.
- f) Checking of earthing.
- g) Alignment and levelling
- h) Verification of welding as per the approved drawings and the quality of welding.
- i) Verification of proper power and control cable Glanding, termination and provision of proper supports for power and control cables.

COMMISSIONING CHECKS:

- j) Each wire shall be traced and tested for its continuity.
- k) Checking of wiring with relevant drawing along with interconnections between equipment.
- l) Measurement of Insulation Resistance of control circuits.
- m) Measurement of Insulation Resistance of Power circuits.
- n) Functional checks on switchgear, meters, CTs etc.

CURRENT TRANSFORMERS:

All the Current Transformers shall be subjected to the following tests.

- o) Check nameplate details according to specification.
- p) Check for physical damage.
- q) Check tightness of all bolts, clamps and connecting terminals.
- r) Ensuring the earth connections
- s) Winding resistance checks
- t) CT ratio and polarity test

- u) IR check
- v) Functional check.

METERS:

All the meters shall be subjected to the following tests:

- a) Check name plate details according to specification.
- b) Check for physical damage.
- c) IR check for all insulated portions
- d) Functional checks

6.5.32 DATA SHEET FOR MCCBs:**General**

- Moulded-Case Circuit Breakers (MCCB) shall comply with IEC 60947 / Indian standards. They shall be of category A with a rated service breaking capacity (Ics) equal to the ultimate breaking capacity (Icu) - on all the operational voltage range for the ratings.
- The design of MCCB shall also meet the requirements of ISO 14062 especially MCCB's materials shall be of halogen free type. The manufacturer shall implement non-polluting production processes that do not make use of chlorofluorocarbons, chlorinated hydrocarbons, ink for cardboard markings, etc.
- MCCBs shall be fixed type with 4 Pole versions.
- It shall provide class II insulation (according to IEC 60664-1 standard) between the front and internal power circuits
- It shall be equipped with a "push to trip" button in front to test operation and the opening of the poles.
- The electrical durability of MCCBs, as defined by IEC 60947-2 standard shall be minimum 12,000 operations up to 160A ,10,000 operations up to 250A, 4000 operations up to 630A and 2500 operations up to 800A).

Protection functions

- The thermal-magnetic / Microprocessor trip units shall be adjustable and possible to fit lead seals to prevent unauthorized access to the settings.

- Protection settings shall apply to all the circuit breaker poles
- The trip units setting dial must be on front side.

6.5.33 STREET LIGHT SYSTEM: (Item no-29)

GENERAL:

Scope includes supply, loading, transportation, unloading, erection of poles, and installation of LED light fittings, testing and commissioning the system.

INSTALLATION OF STREET LIGHT POLES:

Scope includes preparation of foundation wherever required by excavation of pit for required depth in any type of soil including soft rock, disposal of soil away from roadside, casting of RCC of grade M20 foundation as per the drawing with required reinforcement bars, shuttering arrangements, embedment of 4 No's of 20mm dia, 600mm long foundation bolts, supply and embedment of 1.25 meter length 2 no's 50 mm dia HDPE pipe of approved make meeting IS 4984 specifications as per drawing and technical specifications. Scope includes applying bitumen paint over the foundation, restoring the area to its original state without damaging the nearby equipments. Shuttering material shall be of metallic with proper fixing arrangement.

The Octagonal Poles shall be bolted on foundation with a set of four foundation bolts already embedded during casting of RCC foundation. The scope also includes transportation of Poles to erection location at Anuvijay Township, erection of poles, fixing it on foundation bolts, filling the gap between pole and foundation with cement mortar, painting of pole and arm with one coat of Aluminium paint after erection, numbering of pole etc. Poles may be lifted using Hydra / cranes for fixing on foundations. Concrete cube testing shall be done for every lot / batch of concrete mixture. Cubes of 150x150x150 mm shall be prepared for testing and got tested as per the standard procedure.

All required hardware (including those required for fixing of light fixtures and brackets) & consumables (including paints) required to complete the work in all respect is in the scope of contractor. Hardware used shall be of GI / nickel / cadmium coated.

6.5.34 INSTALLATION, TESTING AND COMMISSIONING OF STREET LIGHT FITTINGS.

Scope includes supply and installation of LED street light fittings along with control gears in arm / bracket, supply and laying of 3C x 2.5 sqmm unarmoured PVC sheathed copper multi strand flexible cable from Pole JB/ terminal box to each LED fittings, termination of cable and checking the functional features of LED fittings. All consumables and hardware

including supply of 3C x 2.5 sqmm PVC multi strand copper cable, ring type copper stud & lugs etc required to complete the job in all respects is in the scope of contractor.

All the light fittings shall be tested before installing on pole. After due commissioning checks, the entire system shall be commissioned and energized. If any LED is not functioning well or not at all glowing, then same shall be replaced with new one without any additional charge with intimation to Engineer in Charge for further actions. Luminaries failed during commissioning shall be returned to NPCIL for issuing new one for replacement.

Also, the contractor should check the JB's/terminal block inside the Pole for any deficiency. If any damage or items are missing, the same shall bring to knowledge of Engineer in Charge before taking over the materials for erection. NPCIL will not be responsible for any damage / missing of components during the custody of contractor. The contractor shall clean the JB/TB and Pole arm before starting the termination activities.

6.5.35 EARTHING OF POLES: (Item no-30)

The contractor shall finish the Pole earthing before taking up of cabling work. Scope includes supply and installation of 20 mm diameter and 3 meter length GI rod, dig a hole of 3 mtr X 100 mm diameter in the soil to insert the GI rod at vertical position, filling of the hole with Electroclite / approved back fill compound of Min. 20 kg, welding and installation of 25mm X 6mm GI flat of 200 mm length on rod for making earth connection between the Pole and GI rod. Supply of all accessories / hardware /consumables required to complete the work in all respect like nut, bolt and lugs etc are in contractor's scope. All weld areas shall be cleaned thoroughly and painted with Zinc rich Aluminium paint. GI rod / strip shall be of hot dip galvanized with a minimum thickness of 80 micron. Bimetallic washers shall be used wherever Copper to GI or AL connections are to be done.

6.5.36 SUPPLY AND LAYING OF COPPER EARTH CONDUCTOR FOR POLES.

Contractor has to supply 16 sqmm flexible multi strand tinned bare copper conductors for earthing of pole to earth pit as per SOQ. The copper conductor has to be cut as per the required length and connected between GI strip welded on earth rod and earth stud provided on pole using tinned copper lugs. Supply of required copper lugs, GI hardware viz nuts, bolts, and bimetallic washers etc to complete the work in total is in the scope of contractor.

6.5.37 TESTING, COMMISSIONING AND HANDING OVER.

The entire system shall be tested as per standards and test reports shall be submitted to EIC before charging the system. After checking the IR value of circuits, system shall be energized and checked for any deficiencies.

STRUCTURAL STEEL MATERIAL:

Scope includes supply of approved make structural steel materials of various sizes ISMB, ISMC, ISA, Flats, MS plates, MS rods, chequered plate etc. Before fabrication, thorough cleaning of the materials shall be done and apply one coat of red oxide primer. After fabrication as per drawings / requirements, weld portions may be cleaned and one coat of primer shall be applied there. Then the total fabricated structure may be applied with one coat of enamel Aluminium paint. Erection of fabricated materials at site may be done as per the requirement by either welding or anchoring. Do the second coat of final painting after erection at site. Weld joints shall be cleaned and applied with primer and paint before applying final coat of paint. Measurement will be based on the finished product weight. All incidental charges, consumables, hardware etc to complete the work in all respect will be in the scope of contractor. All hardware such as nuts, bolts, washers etc shall be GI / nickel plated / cadmium plated suitable for saline atmosphere.

BRICKS:

The size of bricks shall be (225mm x 115mm x 75mm). Permissible tolerance on dimensions shall be + 3 mm in length & + 1.5 mm in width/thickness. The contractor shall get approval of the sample and source of bricks from the Engineer-in-charge before procurement on large scale and shall maintain the same for the entire work. The minimum crushing strength shall not be less than 50 Kg/cm² and water absorption shall not be more than 20% by weight.

DRILLING OF HOLES:

Holes are to be drilled in PCC / RCC using core cutting machine up to a diameter of 100 mm wherever required. Breaking of PCC / RCC with other means is not permitted to make holes. Measurement will be based on the cubic inch volume of hole.

INSTALLATION OF THERMOPLASTIC STREET LIGHT JBS:

Thermo plastic boxes of approximate size 300mm x 200mm x 150 shall be installed to walls / ceilings using 6 mm GI anchor fasteners. Required drills are to be made on walls and JBs shall be fixed as per the requirements. The earth ring should be used to ensure the continuity of cable earthing. Scope includes assembling of components supplied along with street light JBs and internal wiring of the same.

SUPPLY OF HDPE PIPES:

Supply of approved tested 110 mm (10Kg/Cm²) High density poly-ethylene of PE 80 grade pipes of approved make as per I.S. 4984-1978 including necessary welding and specials like elbows, bends, tees and reducers, tail piece, GI flange. It should undergo cleaning and pressure testing with clean water as per standard specification. The scope also includes laying and Fixing in position at required elevations on walls, beneath the floors, ground,

road crossings etc and rectifying the leaks if found after the erection (Excavation will be measured under relevant item).

6.5.38 INSPECTION, TESTING, ACCEPTANCE CRITERIA AND REPORTS:

All electrical systems shall be tested and commissioned as per specifications. Pre-commissioning checks and tests shall include but not be limited to the following:

- (i) Sample of all the materials shall be submitted to the EIC and got approved before bulk supply.
- (ii) The insulation resistance of each circuit shall be measured, recorded in presence of representative of EIC and it should not be less than 5 Mega ohms. (Between phases, phases to neutral, phase/neutral to Earth). Check list shall be prepared and filled for each circuit / panel / system as per the requirement and direction from EIC.
- (iii) Earth resistance of all earth pits shall be measured and report shall be submitted. Resistance value should not exceed 5 Ohm.
- (iv) Contractor shall duly fill in all the above test results and submit the test reports to Engineer-in-Charge in triplicate.
- (v) AS BUILT DRAWINGS of Electrical network single line diagram, layout drawings of cable routes with cable tags, street light layout with circuit diagram etc shall be prepared by the Contractor and two sets of hard copies plus 1 set of soft copy in CD, shall be submitted to EIC.

6.5.39 WARRANTY/ GUARANTEE REQUIREMENTS:

All electrical components / equipment shall be guaranteed for a period of 3 year from the date of energising and handing over / as per the details given in the individual equipment technical specification.

LIST OF DRAWINGS:

The drawings provided are for information only. Locations / routes are to be finalised and got approved in discussion with ENC before executing the work.

- 6M Street light pole foundation details
- Street light layout
- Power cable route

6.5.40 ANNEXURE-1 - LIST OF APPROVED MAKES:

Sl. No	Item description	Approved Make / Model	WARRANTY/ GUARANTEE
1.	Cables / wires	Havells / Gloster / Polycab / Finolex / Anchor	3 years
2.	Cable Glands, Cable lugs, Lead rawl plug	Siemens / SMI /Jainson	3 years
3.	Heat shrinkable Cable Jointing Kit	Raychem / 3M	3 years
4.	Panels	L&T / Schneider / / BCH/ PMK Engineering, Madurai / Teekay Engg. Chennai / Sakthi Engg,	3 years
5.	Copper bonded maintenance free earth system	Spike Power Protection Systems & Technologies, Chennai, Ashlok safe earthing electrode limited, chennai	3 years
6.	Structural Steel	JSM / TATA / SAIL	3 years
7.	HDPE 50 mm 6Kg pipe	Jain / Jindal / Reliance / Supreme / Kothari/ Kitech / Tata	3 years
8.	Paint	Asian paints / Berger	3 years
9.	SS Anchor fasteners	Hilti HSA – R- M 10 * 98 35/25 / Fischer FBN II 10/20 R	3 years

6.6 Specifications

6.6.1 Table for size of panels

Size of the panels

SI No.	Description	Min Size of the panel	Preferred makes
1.	Metallic box for lift room, Metallic box for pump starters	350 x 250 x 250 mm	L&T, SIEMENS, Schneider, PMK Engineering Services, Madurai.
2.	Metallic box for auto controller / contactor box for lighting.	500 x 400 x 250 mm	Barduct Electricals, Saidapet, Chennai. Teekay Power Technic, Chennai
3.	DBs	As per catalogue nos.	-

7.0 Inspection, Testing, acceptance criteria and reports

Lighting system installation shall be tested and commissioned by installation contractor as per specifications. Pre-commissioning checks and tests shall include but not be limited to the following:

- (vi) All the materials shall be confirming to the IS / IEC standards (even if it is not mentioned specifically) and corresponding tests shall be conducted / test certificates shall be submitted before supply.
- (vii) Sample of all the materials shall be submitted to the ENC and got approved before bulk supply.
- (viii) The insulation resistance of each wiring circuit without the lamps (load) being in place shall be measured and it should not be less than 500,000 ohms. (Between phases, phases to neutral, phase/neutral to Earth).
- (ix) It shall be ensured that switch provided for ON/OFF control of point is only on LIVE side
- (x) Operation of RCBOs shall be checked.
- (xi) Earth resistance of all earth pits shall be measured and report shall be submitted. Resistance value shall be less than 5 Ohm.
- (xii) Contractor shall duly fill in all the above test results and submit the test reports to Engineer-in-Charge in triplicate.
- (xiii) All lighting layout drawings shall be prepared by the Contractor and shall be marked by contractor for 'AS BUILT STATUS' and two sets of hard copies plus 1 set of soft copy in pen drive, shall be submitted to NPCIL.

8.0 WARRANTY/ GUARANTEE REQUIREMENTS

The contractor shall provide warranty/guarantee from OEM from the date of installation of items at site. During warranty period contractor shall arrange replacement of failed components at work site.

9.0 LIST OF ATTACHMENTS

- 1) Drawings for SLDs and Electrical layouts.

10.0 LIST OF APPROVED MAKES

Sl.No.	Description	Approved makes	Warranty/ guarantee
1.	Passengers lift	KONE/OTIS/Mitsubishi/Johnson /Omega/Schindler/Hitachi/Fujitech	5 Years

		/Epic/ThyssenKrupp	
2.	Analogue Time switch 230V, Analogue dial -24 hrs with manual over ride switch with min. 100 hrs working reserve	Legrand / L&T / salzer / Siemens / Schneider	3 Years
3.	Decorative type LED '4 Feet' aluminium extruded tube light fitting	Philips/Havells/ CG/Wipro	3 Years
4.	Rising main bus duct and accessories	Schneider / Legrand / L&T	3 Years
5.	Wall mounted LED Mirror light	Philips/Havells/ CG/Wipro	3 Years
6.	LED surface /ceiling mounted light fitting with Opel diffuser	Philips/Havells/ CG/Wipro	3 Years
7.	Weather proof Integrated LED Bulk head luminaries	Philips/Havells / CG/Wipro	3 Years
8.	1200mm sweep BLDC ceiling fan	CG(Aero swift)(/ Orient(Tome pro) /Havells(FAB BLDC PRO) /Automberg(Renesa enzel)	3 Years
9.	Exhaust fans 3000 mm sweep - Heavy duty	Khaitan / Almonard / CG / Orient	3 Years
10.	FRLS PVC Conduits-heavy duty with ISI mark	SUN (Jayam polymers) /Avon Plast / Bajaj Plast / Precision /Hello	3 Years
11.	Copper flexible wires FRLHF	Finolex / Havells / Gloster / RR Kabel / RPG / Anchor / / V guard/Hello	3 Years
12.	Crimping type lugs	Dowell's / Siemens / jainson	3 Years
13.	Digital Energy Meter	Schneider / Siemens / ABB / L&T	3 Years
14.	Water heaters	V-guard (victo DG)Havells (Adonica Spin 5S)/ Bajaj(pentacle DIGI)	5 Years
15.	Modular switches and accessories	Legrand mylink / Schneider / MK blenze	3 Years
16.	Lightning Arrestors / earthing rod	Spike Power Protection Systems & Technologies, Chennai, Ashlok safe earthing electrode limited, Chennai.Ericco earthing system	5 Years
17.	Anchor fasteners	Hilti / Fisher	3 Years
18.	Terminal blocks	Wago / connect well	3 Years

11.0 ABBREVIATIONS USED:

BIS	:	Bureau of Indian Standards
CEA	:	Central Electricity Authority
DB	:	Distribution Board

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DC	:	Direct Current
FFL	:	Finished Floor Level
FRLS	:	Fire Retardant PVC
FRLHF	:	Fire Retardant Less smoke and Halogen free wire
GI	:	Galvanised Iron
HRC	:	High Rupturing Capacity
IP	:	Ingress Protection
IS	:	Indian Standards
JB	:	Junction Box
LDB	:	Lighting Distribution Board
LV	:	Low voltage
LED	:	Light Emitting Diode
MCB	:	Miniature Circuit Breaker
MCCB	:	Moulded case circuit breaker
MS	:	Mild Steel
PVC	:	Polyvinyl Chloride
RCBO	:	Residual Current circuit Breaker with over current protection
SFU	:	Switch Fuse Unit
SLD	:	Single line diagram
TPN	:	Three Phase and Neutral

Supply, Installation and Commissioning of Communication systems to 2 No of B-Type , 2 No of Dspl, 1 No of E Multi & 3 No of F -Type Bldgs (203 Qtrs) at Anu Vijay township

Item No: 1. 200 pair Telephone cables Jelly filled Armoured cables

Jelly Filled Telephone cable shall be as per the following specification and generally conform to the GR/CUG-01/03.Aug 2003

Conductor	: 0.5mm dia solid annealed bare copper confirming to IEC: 28 or IEC:12444
Insulation	: Solid polythene
Cable pairs	: 200 Pairs
Jelly filling	: Jelly shall be filled in the intersticks of the cable core
Polyester taping	: Polyester tape applied longitudinally / helically over the laid-up Core/cable
Screening	: Poly aluminium tape: Applied longitudinally over polyester tape with overlap
Self Suspension wires/strand	: Galvanized steel wire
Sheathing	: Polythene applied in the form of an extruded layer
Bedding	: Two PE tapes applied helically
Armouring	: Two galvanized steel tape armoured applied helically
Jacketing	: Polythene applied in the form of extruded layer
Length	: Preferably Min. 750m \pm 10% per drum

laying

Cables shall be transported in drums from the contractor stores to the work place carefully without any damages. Rolling of drums shall be avoided as far as practicable. In absence of any indication, the drums may be rolled in the same direction as it was rolled during taking up the cable.

- For un reeling the cable, the drum shall be mounted on jacks or on cable wheel. The spindle shall be strong enough to carry the weight without bending. The drum shall be rolled on the spindle slowly so that cable should come out over the drum and not below the drum.
- While laying cable, cable rollers shall be used at an interval of 2 meters. The cables shall be pushed over the roller by a gang of people positioned in between rollers. The cable shall not be pulled from the end without having intermediate pushing arrangement. Bending radius shall not be less than what is specified by the manufacturer.
- Directly buried cables shall be laid on and covered with sand and protected by brick barriers on top.

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- Each cable shall be tagged with numbers. Cables shall be tagged at their entrance and/or exist from any of equipment, junction or pull box.
- The tags shall be of aluminium with the number punched on it and securely attached to the cable with not less than two turns of G.I. wire.
- Location of cables laid directly underground shall be indicated clearly by cable marker made of galvanized iron. The Location of cable joint, if any, shall be clearly indicated with cable marker with an additional inscription 'cable joint'. The marker shall project 150mm above and shall be spaced at an interval of 30 meters and at every change of direction.
- Cables shall be terminated using polyamide Suggested Make cable glands of proper size in the JB's.
- For each pair termination in crone module to be carried out for the both ends.
- Termination and wire connection shall be carried out in such a manner as to avoid strain on the terminal.
- All cable entry point shall be sealed and made vermin and dust proof. Unused opening, if any, shall be effectively closed.

Item No: 2. 50 pair Telephone Armoured Jelly filled cables

Jelly Filled Telephone cable shall be as per the following specification and generally conform to the GR/CUG-01/03.Aug 2003

Conductor	: 0.5mm dia solid annealed bare copper confirming to IEC: 28 or IEC:12444
Insulation	: Solid polythene
Cable pairs	: 50 Pairs
Jelly filling	: Jelly shall be filled in the intersticks of the cable core
Polyester taping	: Polyester tape applied longitudinally / helically over the laid-up Core/cable
Screening	: Poly aluminium tape: Applied longitudinally over polyester tape with overlap
Self Suspension wires/strand	: Galvanized steel wire
Sheathing	: Polythene applied in the form of an extruded layer
Bedding	: Two PE tapes applied helically
Armouring	: Two galvanized steel tape armoured applied helically
Jacketing	: Polythene applied in the form of extruded layer
Length	: Preferably Min. 750m \pm 10% per drum

laying

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Kudankulam Nuclear Power Project	Construction of 203 Nos of Residential Quarters comprising of 40 Nos of E-type (G+10 floor-1 Tower), 80 Nos of D-Special quarters (G+10 floor-2 Tower), 80 Nos of B-type quarters (G+10 floor-2 Tower) and 3 Nos of F Type quarters (G+1 floor) at Anuvijay Township
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Cables shall be transported in drums from the contractor stores to the work place carefully without any damages. Rolling of drums shall be avoided as far as practicable. In absence of any indication, the drums may be rolled in the same direction as it was rolled during taking up the cable.

- For un reeling the cable, the drum shall be mounted on jacks or on cable wheel. The spindle shall be strong enough to carry the weight without bending. The drum shall be rolled on the spindle slowly so that cable should come out over the drum and not below the drum.
- While laying cable, cable rollers shall be used at an interval of 2 meters. The cables shall be pushed over the roller by a gang of people positioned in between rollers. The cable shall not be pulled from the end without having intermediate pushing arrangement. Bending radius shall not be less than what is specified by the manufacturer.
- Directly buried cables shall be laid on and covered with sand and protected by brick barriers on top.
- Each cable shall be tagged with numbers. Cables shall be tagged at their entrance and/or exist from any of equipment, junction or pull box.
- The tags shall be of aluminium with the number punched on it and securely attached to the cable with not less than two turns of G.I. wire.
- Location of cables laid directly underground shall be indicated clearly by cable marker made of galvanized iron. The Location of cable joint, if any, shall be clearly indicated with cable marker with an additional inscription 'cable joint'. The marker shall project 150mm above and shall be spaced at an interval of 30 meters and at every change of direction.
- Cables shall be terminated using polyamide Suggested Make cable glands of proper size in the JB's.
- For each pair termination in crone module to be carried out for the both ends.
- Termination and wire connection shall be carried out in such a manner as to avoid strain on the terminal.
- All cable entry point shall be sealed and made vermin and dust proof. Unused opening, if any, shall be effectively closed.

Item No: 3, Telephone Line cord Cable

Color/Finish Family	White/Black
Connector Type	RJ11
Contact Material	Copper
Insulating Material	Plastic
Wire Contact	Stranded wire
Use	Telephone cable

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Kudankulam Nuclear Power Project	Construction of 203 Nos of Residential Quarters comprising of 40 Nos of E-type (G+10 floor-1 Tower), 80 Nos of D-Special quarters (G+10 floor-2 Tower), 80 Nos of B-type quarters (G+10 floor-2 Tower) and 3 Nos of F Type quarters (G+1 floor) at Anuvijay Township
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Compatibility	Phone cable
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Item No: 4. 10 pair Jelly filled unarmored cables

Jelly Filled telephone cable shall be as per the following specification and generally conform to the GR/CUG-01/03.Aug 2003

Conductor	: 0.5mm dia solid annealed bare copper
Insulation	: Solid polyethylene as per specification
Jelly filling	: Jelly shall be filled in the inter sticks of the cable core
Polyester taping	: Polyester tape applied longitudinally / helically over the laid-up Core/cable
Screening	: Poly aluminum tape: Applied longitudinally over polyester tape with overlap
Self Suspension wires/strand	: Galvanized steel wire as per specification
Sheathing	: Poly ethylene applied in the form of an extruded layer
Bedding	: Two PE tapes applied helically
Armouring	: Un armored
Jacketing	: Poly ethylene applied in the form of extruded layer
Length	: Preferably Min. 750 ±10% per drum
Recommended Make	: finolex, delton, Havell, Lapp, Servel, Reliance, R&M, RR Kabel

Laying

For laying of 10 pair Telecom cables cable to be laid through cable Tray from Ground floor junction box to Top Floor Junction Box it should be proper routing using Cable Ties. Each cable shall be tagged with numbers. Cables shall be tagged at their entrance

Item No: 5. 5 pair Jelly filled Armored cables

Jelly Filled Telephone cable shall be as per the following specification and generally conform to the GR/CUG-01/03.Aug 2003

Conductor	: 0.5mm dia solid annealed bare copper confirming to IEC: 28 or IEC:12444
Insulation	: Solid polythene
Cable pairs	: 5 Pairs
Jelly filling	: Jelly shall be filled in the intersticks of the cable core
Polyester taping	: Polyester tape applied longitudinally / helically over the laid-up

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Kudankulam Nuclear Power Project	Construction of 203 Nos of Residential Quarters comprising of 40 Nos of E-type (G+10 floor-1 Tower), 80 Nos of D-Special quarters (G+10 floor-2 Tower), 80 Nos of B-type quarters (G+10 floor-2 Tower) and 3 Nos of F Type quarters (G+1 floor) at Anuvijay Township
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	Core/cable
Screening	: Poly aluminium tape: Applied longitudinally over polyester tape with overlap
Self Suspension wires/strand	: Galvanized steel wire
Sheathing	: Polythene applied in the form of an extruded layer
Bedding	: Two PE tapes applied helically
Armouring	: Two galvanized steel tape armoured applied helically
Jacketing	: Polythene applied in the form of extruded layer
Length	: Preferably Min. 750m \pm 10% per drum

Item No: 6. 10 pair Telephone Armored Jelly filled cables

Jelly Filled Telephone cable shall be as per the following specification and generally conform to the GR/CUG-01/03.Aug 2003

Conductor	: 0.5mm dia solid annealed bare copper confirming to IEC: 28 or IEC:12444
Insulation	: Solid polythene
Cable pairs	: 10 Pairs
Jelly filling	: Jelly shall be filled in the intersticks of the cable core
Polyester taping	: Polyester tape applied longitudinally / helically over the laid-up Core/cable
Screening	: Poly aluminium tape: Applied longitudinally over polyester tape with overlap
Self Suspension wires/strand	: Galvanized steel wire
Sheathing	: Polythene applied in the form of an extruded layer
Bedding	: Two PE tapes applied helically
Armoring	: Two galvanized steel tape armoured applied helically
Jacketing	: Polythene applied in the form of extruded layer
Length	: Preferably Min. 750m \pm 10% per drum

laying

Cables shall be transported in drums from the contractor stores to the work place carefully without any damages. Rolling of drums shall be avoided as far as practicable. In absence of any indication, the drums may be rolled in the same direction as it was rolled during taking up the cable.

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Kudankulam Nuclear Power Project	Construction of 203 Nos of Residential Quarters comprising of 40 Nos of E-type (G+10 floor-1 Tower), 80 Nos of D-Special quarters (G+10 floor-2 Tower), 80 Nos of B-type quarters (G+10 floor-2 Tower) and 3 Nos of F Type quarters (G+1 floor) at Anuvijay Township
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- For un reeling the cable, the drum shall be mounted on jacks or on cable wheel. The spindle shall be strong enough to carry the weight without bending. The drum shall be rolled on the spindle slowly so that cable should come out over the drum and not below the drum.
- While laying cable, cable rollers shall be used at an interval of 2 meters. The cables shall be pushed over the roller by a gang of people positioned in between rollers. The cable shall not be pulled from the end without having intermediate pushing arrangement. Bending radius shall not be less than what is specified by the manufacturer.
- Directly buried cables shall be laid on and covered with sand and protected by brick barriers on top.
- Each cable shall be tagged with numbers. Cables shall be tagged at their entrance and/or exist from any of equipment, junction or pull box.
- The tags shall be of aluminium with the number punched on it and securely attached to the cable with not less than two turns of G.I. wire.
- Location of cables laid directly underground shall be indicated clearly by cable marker made of galvanized iron. The Location of cable joint, if any, shall be clearly indicated with cable marker with an additional inscription 'cable joint'. The marker shall project 150mm above and shall be spaced at an interval of 30 meters and at every change of direction.
- Cables shall be terminated using polyamide Suggested Make cable glands of proper size in the JB's.
- For each pair termination in crone module to be carried out for the both ends.
- Termination and wire connection shall be carried out in such a manner as to avoid strain on the terminal.
- All cable entry point shall be sealed and made vermin and dust proof. Unused opening, if any, shall be effectively closed.

Item No: 7. CAT6 LAN Cable

Comply with Cat6 specifications

4-pair unshielded twisted pair (UTP) cable

Pairs are braided in aluminum foil with drain wire

23 AWG solid copper conductor for superior conductivity

HDPE insulation

FR PVC Jacket

Verified compliant with EIA/TIA standards by ETL

UL-listed

Packaged in an easy-to-pull box for easier installation

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Kudankulam Nuclear Power Project	Construction of 203 Nos of Residential Quarters comprising of 40 Nos of E-type (G+10 floor-1 Tower), 80 Nos of D-Special quarters (G+10 floor-2 Tower), 80 Nos of B-type quarters (G+10 floor-2 Tower) and 3 Nos of F Type quarters (G+1 floor) at Anuvijay Township
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Category : 6 UTP Solid cable

Conductor : Conductor : 23 AWG (Solid)

Conductor Meta : Conductor Meta : Bare Copper

Insulation Material : HD-PE

OD : 6.1mm \pm 0.2

Resistance Unbalance : 5% Max

Capacitance Unbalance : 330pF/100m

Delay Skew : <50nS

Recommended Make: D Link, Finolex, Elixir

Item No: 8. 200 Pair Telephone jointing kit

Supply of 200 pair 0.5mm conductor size jointing kit should be RTSF-4 (Thermo-Shrink jointing copper closure system) and shall have the following features

- (i) Can be deployed in all environments: buried, underground and aerial.
- (ii) Superior mechanical protection
- (iii) Easy installation
- (iv) Better copper joints & properly protects to joints
- (v) long term reliability
- (vi) Easy maintenance
- (vii) Superior impact resistance

Cable jointing shall be done as per the jointing kit Manufacturer's instruction.

Suggested Make: 3M /Raychem/R&M/Dot/BSNL approved Make

Item No: 9, Telephone Coilcord Cable

Cover Material	PVC
Type	Cat 3
Material Shape	Flat Wire
Conductor Type	Stranded
Wire Core Material	Tinned Wire
Conductor	4 X 0.10 Copper Foil Wire

Kudankulam Nuclear Power Project	Construction of 203 Nos of Residential Quarters comprising of 40 Nos of E-type (G+10 floor-1 Tower), 80 Nos of D-Special quarters (G+10 floor-2 Tower), 80 Nos of B-type quarters (G+10 floor-2 Tower) and 3 Nos of F Type quarters (G+1 floor) at Anuvijay Township
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Insulation Material	PP 1.0±0.05mm
Cutaway Size	2.5±0.2mm * 4.9±0.2mm
Specification	PVC and Copper

Item No: 10. 50 Pair Telephone jointing kit

Supply of 50 pair 0.5mm conductor size jointing kit should be RTSF-3 (Thermo-Shrink jointing copper closure system) and shall have the following features

- (i) Can be deployed in all environments: buried, underground and aerial.
- (ii) Superior mechanical protection
- (iii) Easy installation
- (iv) Better copper joints & properly protects to joints
- (v) long term reliability
- (vi) Easy maintenance
- (vii) Superior impact resistance

Cable jointing shall be done as per the jointing kit Manufacturer's instruction.

Suggested Make: 3M /Raychem/R&M/Dot/BSNL approved Make

Item No: 11. Specification for the fabricated Outdoor Junction Box for 500 Pair Telephone Cable.:

Size of the junction boxes shall be as per the DOT specifications .Telephone junction Boxes shall be made of 2mm thick CRCA sheet, epoxy powder coated inside and outside and shall have hinged door with integrated locking arrangement and chrome plated handles. Powder coating thickness shall be 80 microns (min.) Jbs shall conform to IP55 degree of protection. The supply shall include the following items

Construction : Welded

Basic Frame : Zinc Steel

Front Door : Lockable

Rack standard : Conforms to DIN 41494 or equivalent standard

Standard Finish : Powder Coating

Powder coating

Thickness : 80 microns (min.)

Standard Color: Textured Grey

Top & Bottom : Welded, with necessary ventilation and Cable entry cutouts on the bottom panel,

Standard Mounting Option: Wall or Pole or Floor mounting brackets

1. Krone module with SS Back mount frame 22.5mm pitch suitable for 2/10 disconnection

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Kudankulam Nuclear Power Project	Construction of 203 Nos of Residential Quarters comprising of 40 Nos of E-type (G+10 floor-1 Tower), 80 Nos of D-Special quarters (G+10 floor-2 Tower), 80 Nos of B-type quarters (G+10 floor-2 Tower) and 3 Nos of F Type quarters (G+1 floor) at Anuvijay Township
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modules.

2. Krone module 2/10 disconnection module as per JB termination capacity.
3. Suitable size compression gland.
4. Nylon split hooks for cross jumpering in outdoor JBs

Telephone Junction Boxes shall have out going connection to various blocks for intercom and P&T separately. Junction Box shall have detachable gland plate at the bottom and knock out holes for termination of telephone cables. JBs shall be and complete with double compression type cable glands suitable for terminating cables. Earthing stud shall be provided. There shall be adequate space for labelling the terminal blocks. The terminal block shall be numbered. Additional knock out holes shall be provided for future cabling and it should be properly screwed by suitable gland plate.

JB Size (To accommodate 500 Pair) - 500 Pair (Along with Krone connector)

Junction boxes shall be supplied along with canopy. Before executing supply, drawing shall be submitted by bidder for approval to NPCIL after approval only supply shall be executed.

Installation:

Scope includes excavation of pits, concreting with 1:2:4 mix, fabrication and installation of 65x65x6mm Ms angle frame, mounting bolts and other required accessories etc. The frame shall be painted with one coat of primer and two coats of epoxy paint.

Item No: 12. 50 pair Telephone Junctions Box

Junction boxes shall be made of Glass fibre Reinforced Polyester (SMC) Conforming to DIN 16911 type 803 or DIN 16913 type 834- 834.5 with minimum IP 65 weather proof enclosures . Provision for cable entry through glands (IP-65), door and standard industrial locking arrangements, 50 pair Telephone LSA plus krone modules, with suitable SS back mount frame.

Toxicity : Halogen – free
 Colour : Silver Grey, RAL7001 /7035
 Size : 250mm x 400mm x 120cm (L X H X W)

Telephone Krone Module LSA Technical data:

Copper conductor Diameter	: 0.40-080mm. (AWG26-20)
Multistand conductor	: 7/0.2-7/0.32mm
Insulation Diameter	: 0.70-1.50 mm
Number of equal diameter solid	: : 2max. (up to 0.65mm each)
Conductors per slot Environmental data environment for use	: Indoors or enclosed cabinets outdoor with a minimum degree of protection to IP54 (IEC529)
Storage temperature	: 0.40-080mm. (AWG26-20)
Operating temperature	: -20C to +80C

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Kudankulam Nuclear Power Project	Construction of 203 Nos of Residential Quarters comprising of 40 Nos of E-type (G+10 floor-1 Tower), 80 Nos of D-Special quarters (G+10 floor-2 Tower), 80 Nos of B-type quarters (G+10 floor-2 Tower) and 3 Nos of F Type quarters (G+1 floor) at Anuvijay Township
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Max operating humidity : 93% relative humidity no-condensing
Recommended Make : Hensel, Devipolymer, Scame, Rittal, Ensto,
ADC Krone, Spelsberg

Installation of 50 pair Telephone Junction Box.

Telephone terminal cabinets are mounted inside of panel rooms, with either concrete anchors, or below-the-floor beam clamps, uninstructed channel, unistrut spring nuts, all-thread threaded rod, nuts and washers. Installation as floor plans, elevation drawings, explicit instructions, with proper parts of 50 Pair telephone Junction Box.

Item No: 13. 10 Pair Telephone Junction Box

Junction boxes shall be made of Glass fibre Reinforced Polyester (SMC) Conforming to DIN 16911 type 803 or DIN 16913 type 834- 834.5 with minimum IP 65 weather proof enclosures . Provision for cable entry through glands (IP-65), door and standard industrial locking arrangements, 10 pair Telephone LSA plus krone modules, with suitable SS back mount frame.

Toxicity : Halogen – free
Colour : Silver Grey, RAL7001 /7035
Size : 250mm x 255mm x 120cm (L X H X W)

Telephone Krone Module LSA Plus Technical data:

Copper conductor Diameter : 0.40-080mm. (AWG26-20)
Multistand conductor : 7/0.2-7/0.32mm
Insulation Diameter : 0.70-1.50 mm
Number of equal diameter solid : 2max. (up to 0.65mm each)
Conductors per slot Environmental : Indoors or enclosed cabinets outdoor with a
data environment for use minimum degree of protection to IP54
(IEC529)
Storage temperature : 0.40-080mm. (AWG26-20)
Operating temperature : -20C to +80C
Max operating humidity : 93% relative humidity no-condensing
Recommended Make : Hensel, Devipolymer, Scame, Rittal, Ensto,
ADC Krone, Spelsberg

Installation of 10 Pair Telephone Junction Box.

Telephone terminal cabinets are mounted inside of panel rooms, with either concrete anchors, or below-the-floor beam clamps, uninstrut channel, unistrut spring nuts, all-thread threaded rod, nuts and washers. Installation as floor plans, elevation drawings, explicit instructions, with proper parts of 10 Pair telephone Junction Box.

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Item No: 14. Basic Telephone instruments without caller ID

Type	Basic analog Telephone
Functions	Pulse or Tone dialling
	Redial function
	Pulse or tone dialling, temporary switch over possible
	Ringer volume adjustable
	Manual Pause
	Adjustable ringer volume in 9 steps from the phone keypad
	Recall key (2 Flash times switchable)
	Mute Function
Mounting	Desk/wall mountable
Make/Brand	EUROSAT/ Lextel/ Signtel

Item No: 15. PVC insulated and PVC sheathed telephone 3 pair cables:

Suitable for indoor telephone wiring in multi-storey buildings, offices and factories; for switch-board wiring and private telephone exchanges, for intercom, telecommunication equipments, tele - signaling systems as per TEC spec GR NO.GR/wir/06/03/ March 2002

Conductor	: 0.5mm dia solid annealed tinned copper
Insulation	: Solid polyethylene as per specification
Polyester taping	: Polyester tape applied longitudinally / helically over the laid up Core/cable
Screening	: Poly aluminum tape: Applied longitudinally over polyester tape with overlap
Sheathing	: PVC sheathing
Recommended Make	: finolex, delton, Havell, Lapp, Servel, Reliance, R&M, RR Kabel

Laying

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Kudankulam Nuclear Power Project	Construction of 203 Nos of Residential Quarters comprising of 40 Nos of E-type (G+10 floor-1 Tower), 80 Nos of D-Special quarters (G+10 floor-2 Tower), 80 Nos of B-type quarters (G+10 floor-2 Tower) and 3 Nos of F Type quarters (G+1 floor) at Anuvijay Township
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For laying of 3 pair Telecom cables cable to be pulled from junction box to houses, pulling wire is to be used for laying, it should be continuous throughout the cable conduit. Each cable shall be tagged with numbers using Ferrules. Cables shall be tagged at their entrance.

Item No: 16. Telephone instruments Caller ID with name display

Number of Line	1
One Touch Dial (Stations)	20
Redial Memory (Stations)	20
Auto Redial	Yes
One Touch Redial	Yes (Last One)
Speed Dial (Station)	Yes (10)
Phonebook Name Input (Stations)	50 (Number & Name)
One-Touch Tone Switching	Yes
Insertable Pause	3.5 s
Ringer Volume (Off /Low /High)	Yes/ Yes/ Yes
Ringer Indicator	Yes
Electronic Hold on Music	Yes
Speakerphone (Volume)	Yes (8-Step)
Mute	Yes
On-Hook Dialing	Yes
Handset Receiver Volume	4-Step
Call Restriction	Yes
Dial Lock	Yes
Navigator	Yes
Display	LCD, 3-Line (Dot & 7-Seg + Pict)
	LCD Contrast, 3 or 4-Step
Caller ID	Caller ID *1 (Memory Stations) Yes (50)
	Private Name Display
	Time / Day Stamp from Clock

Kudankulam Nuclear Power Project	Construction of 203 Nos of Residential Quarters comprising of 40 Nos of E-type (G+10 floor-1 Tower), 80 Nos of D-Special quarters (G+10 floor-2 Tower), 80 Nos of B-type quarters (G+10 floor-2 Tower) and 3 Nos of F Type quarters (G+1 floor) at Anuvijay Township
Recommended Make	Panasonic, Signtel, Uniden

Item No: 17. RJ 11 Modular type Telephone Sockets

Product or component type	Telephone socket
telephone socket type	RJ11 (4 contacts) - category 3
Complementary wiring device mounting	Surface Flush Shuttered Socket for Child Safety
socket number	2
number of gangs	2 gangs
material	PBT 15 % FG: insert PC: housing Polycarbonate: plastic part

AWG gauge AWG 26...AWG 24 (2 twisted pair cables)

Installation of the modular sockets termination of cables at socket/ floor junction box side is also covered under scope of the contractor. In the 3 pair Tele cable 1 pair of cable to be terminated at socket/floor junction box side and 2 pairs to be kept free as spare.

Suggested make: Legrand mylink / myrius /MDS Mosaic / MK India / Schneider /Siemens

Item No: 18. Digital TDM Phone

The Siemens Openstage 15 SIP is compatible with the HiPath telephone system and is available for TDM, HFA or SIP environments. This full duplex, hands free telephone, with integrated microphone and speaker, can support the addition of the Openstage Key Module 15 for add-on features

Type of Product	Desk Phone
Color	Black
Keypad	Alphanumeric

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Kudankulam Nuclear Power Project	Construction of 203 Nos of Residential Quarters comprising of 40 Nos of E-type (G+10 floor-1 Tower), 80 Nos of D-Special quarters (G+10 floor-2 Tower), 80 Nos of B-type quarters (G+10 floor-2 Tower) and 3 Nos of F Type quarters (G+1 floor) at Anuvijay Township
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Display Type	Graphical Display
Features	2 Lines Monochrome (not tiltable) Keypad
Material	Plastic
Model No	Siemens Openstage 15 T
Country of Origin	Germany
Application	Office Environment, Conference Rooms, First Class Hotel Rooms
No. of Keys	8 Programmable Keys with Red LEDs (Upgradable with Key Module), 3 Navigation Keys
Type	Digital
Key Type	Control Keys +/-

Item No: 19. HOT DIP Galvanised perforated type cable trays size 60mm(SH)X100mm Wx 3000mm L with cover

General Requirement:-

Cable Tray and Cable Ladder systems are intended for the support and accommodation of cables and possibly other Electrical equipment in Electrical / Instrumentation / Communication systems.

Cable Tray

The cable tray and all accessories shall be fabricated from sheet steel and has to be galvanized against corrosion confirming to EN10346 / ISO1461-1999 for installations in indoor and outdoor applications respectively. The cable trays shall be supplied in standard lengths of 3000 mm and the width of the tray shall be 100mm.

All the cable tray accessories like Bend's, TEES's, Cross over's etc should be designed in accordance with IEC 61537 and shall be factory fabricated. The accessories shall be from the same material as of the tray and modular type, it should be connected with the trays by using fasteners.

For Cable trays designed, tested and confirming to IEC 61537, thickness of cable tray should be according to the manufacturer's catalogue. For locally fabricated and non tested tray, thickness

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should be 2 mm up to span length of 1.5 meter, 2.5 mm for span length between 2 to 3 meter and 3 to 4 mm for span length between 4 and 10 meter

Cover for Cable Trays / Ladders

Cover for trays/ladders to protect the cable insulation from falling objects, water droplets, harmful effects of ultraviolet rays and accumulation of dust. The cover shall be Galvanized sheet steel. The cover for the cable trays shall be of snap fit type.

Design and Fabrication of Cable Trays / Ladders:-

The cable trays / ladders shall be fabricated according to the design specified by IEC 61537 and should be tested for Safe Working Load (SWL). The relevant details of SWL and the load chart with respect to SWL, supporting distance and the deflection should be according to the following chart.

Safe Working Load (SWL) with a span length up to 5 meters								
Description	Side Height (in mm)	Width (in mm)	Span length (in meters)					
			1.5m	2m	2.5m	3m	4m	5m
			Permitted Load (in kg/meter)					
Perforated tray	60	100-500	150	100	50	-	-	-
	100	150-500	185	130	75	60	-	-
Cable Ladder	60	200 - 600		225	150	110	45	-
	110	200 - 600		310	-	140	65	50

Safe Working Load (SWL) with a span length up to 10 meters									
Description	Side Height (in mm)	Width (in mm)	Span length (in meters)						
			4m	5m	6m	7m	8m	9m	10m
			Permitted Load (in kg/meter)						
Perforated Cable Tray for long span	110	200 - 300	160	110	75	-	20	-	-

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distance		400 - 600	200	150	100	-	40	-	-
	160	200 - 300	230	180	140	100	70	-	-
		400 - 600	250	200	160	130	100	-	-
Cable Ladder for long span distance	110	200 - 300	160	110	80	40	-	-	-
		400 - 600	210	150	100	70	-	-	-
	160	200 - 300	230	180	140	100	70	-	-
		400 - 600	250	200	160	130	100	-	-
	200	200 - 600	-	-	300	250	200	140	100

Fabrication of Tray / Ladder and accessories at site and welding is not permitted. In unavoidable circumstances, If any cut or holes are made in the trays/Ladder/accessories, zinc spray need to be applied over the surface. The metal edge has to be protected by edge protection sleeves to avoid cable damage. Edge of the supports has to be protected with plastic END caps. Screwed connections and internal fixing Devices should not create any damage to the cable when correctly fixed. Sudden or jerky motions shall not be used to tighten reusable screw connections.

Cables shall run in cable tray/ladder mounted horizontally or vertically on cable tray support system which in turn shall be supported from floor, ceiling, overhead structures, trestles, pipe racks, trenches or other building structures using mounting accessories

Marking, Documentation, Compliance and Inspection:-

Each system component shall be durably and legibly marked with the manufacturers or responsible vendor's name or trade mark or identification mark a product identification mark which may be, for example, a catalogue number, a symbol, or the like

When system components other than cable tray lengths and cable ladder lengths are supplied in a package, the product identification mark may be, as an alternative, marked on the smallest package unit.

Marking shall be applied, by moulding, pressing, engraving, printing, adhesive labels, or water slide transfers. Compliance is checked by inspection and, for marking on the product, by rubbing by hand for 15 s with a piece of cotton cloth soaked with water and again for 15 s with a piece of cotton cloth soaked with petroleum spirit. Marking made by moulding, pressing, or engraving is not subjected to the rubbing test. After the test, the marking shall be legible.

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If a system component is stored and transported at a temperature outside the declared minimum and maximum temperatures, the manufacturer or responsible vendor shall declare the precautions and the alternative temperature limits. Compliance is checked by inspection.

The manufacturer or responsible vendor shall provide in his literature all information necessary for the proper and safe installation and use of the cable tray system and cable ladder system. The SWL and impact resistance is valid for the whole temperature classification declared. The information shall include

- a. Instructions for the assembly and installation of system components and for the precautions required to avoid excessive transverse deflection, which could cause damage to the cables.
- b. Thermal Expansion properties and precautions to be taken, if necessary,
- c. Material, Surface Treatment and Salt Spray Test certificate
- d. Relative humidity if it affects the material and Surface Treatment

Note: Supplier shall submit test certificate for cables, Krone modules and junction boxes and cable trays.

Recommended Make cable tray: NIDEX/SNIDER/OBO BETTERMAN

Installation of HOT DIP Galvanised perforated type cable trays size 60mm(SH)X100mm Wx 3000mm L with cover

The mounting accessories shall be fabricated from steel and has to be hot dip galvanized against corrosion confirming to ISO 1461-1999 for installations in both indoor and outdoor applications and should be of completely modular type.

All supports and Brackets should be factory made, hot dip galvanized after completing welding, cutting, drilling, other machining operations and tested according to IEC 61537 according to the arrangements in the enclosed drawing. The system shall be designed such that it allows easy assembly at site by using Bolts and Nuts. The main support and brackets shall be fixed at site using necessary brackets, clamps, fittings, bolts, nuts and other hard ware etc to form various arrangements required to support the cable trays. Welding of the components at the site shall not be allowed.

Corrosion Protection:-

The cable tray / ladder/accessories shall be Galvanized according to EN10346 / ISO 1461-1999 for installations indoor and corrosive outdoor applications respectively. Sample tray / ladder / accessories / mounting accessories and supports should be salt spray tested according to ISO

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9227 for > 150 hours & 500 hours. (*155 hours according to class 3 for pre-galvanized surface and 550 hours according to class 6 for Hot dip Galvanized surface as per ISO)

Testing and Certification:-

Cable tray / Ladder, bend, T Bend, cross, and all supports are to be tested for Safe Working Load (SWL), deflections, Impact resistance, Salt Spray & Electrical continuity test according to IEC 61537. The cable tray/ladder should not deflect more than 1/100th of the span length at SWL in Mid span and the transverse deflection of all mounting accessories at SWL shall not exceed 1/20th of the length. The cable tray / cable ladder should be tested up to 1.7 times SWL at minimum and maximum room temperature. The temperature classification of cable tray system should be - 5 to + 150°C.

Item No: 20. Passive splitters (1:32)

Item description	Expected value
Port configuration	: 1:32
Operating wavelength	: 1260-1650nm
Insertion loss	: ≤16.9 dB
Uniformity	: ≤1.5 dB
PDL	: ≤0.3 dB
Directivity	: ≥55 dB
Pigtail type	: Loose tube
Connector	: SC/APC
Max Power	: 300mW
Lead length	: Minimum 1m
Package type	: Box, tube with bare ribbon, flat tube with 900µm fibers
Operating temperature	: -20° to 70°C
Suggested Make	: Net link, Fober, Syrotech

Item No: 21. Fibre Termination Box for 1: 32 fibers splitting

Distribution box Type outdoor Optical Distribution Boxes is designed to connect feeder/distribution cable to subscriber's drop cable using PLC splitter in FTTH networks. It has 2 input ports and 16 output ports on the bottom and it is easy to install on the wall or pole. The rear tray is for splicing a fiber of feeder cable with PLC splitter and the front tray is for connecting

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subscriber's drop cable through adaptor plate on the tray.

- 1) Be made of high impact plastic PC/ABS
- 2) Can accommodate 1x8 PLC splitter and 1x16 PLC splitter
- 3) The high strength plastic, anti-ultraviolet radiation and ultraviolet radiation resistant, resistant to rain
- 4) Up to 16 FTTH drops ,2 inlet ports, 32 outlet ports
- 5) Wall and pole mountable
- 6) The design of the two-tier structure, the upper wiring layer optical splitter, lower for fiber splicing layer.

Item description	Expected value
Unit type	: Outdoor
Mounting type	: Wall/ pole mount
Cable entry	: Inlet: Multiple entry points at bottom Outlet: Minimum 2 cables at 5 sides (left, right, top, bottom, back)
Cable diameter	: Main cable up to 22mm diameter, Drop cable up to 5mm diameter
Capacity	: 32 cores
Splice holder	: Universal splice holder for minimum 24 splices
Insertion loss	: ≤0.35 dB
Return loss	: ≥50 dB
Plug durability	: >1000 times
Insulation resistance	: ≥1000MΩ/500v (DC)
Construction	: UV resistant housing, locking with screw, with gas venting facility, box should allow minimum bending radius of 25mm over a length of 2m
IP rating	: IP40, IP43, IP55
Impact rating	: IK08
Operating temperature	: -40°C - +85°C
Relative humidity	: <85% (at +30°C)
Suggested Make	: Net link, Fober, Syrotech

Installation of junction box:

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Choose an installation location, usually on the wall or on a cable rack. The position should be at least 20 cm away from the cable exit, so as to leave sufficient space for storing the cable. Fix the fiber optic terminal box: Use expansion screws or other suitable methods to fix the fiber optic terminal box on the selected installation location

Item No: 22. Patch cord SC UPC to LC UPC 20 mtr

Item description	Expected value
Splicing type	: APC connector
Cable Length	: 20 meter
Type	: SC/LC Single-mode fiber
Insertion loss	: ≤0.2dB
Return loss	: ≥55dB
Repeatability	: ≤0.1dB
Temperature	: -40° to 80°C
Environmental space	: LSZH
Diameter on sheath	: 2mm
Cladding diameter	: 125nm
Mode field diameter	: 9nm

Suggested Make: Netlink/Syrotech/Optrotech

Item No: 23. Outdoor junction box.

Specification for the fabricated Outdoor Junction Box:

Size of the junction boxes shall be as per the specifications. It's shall be made of 2mm thick CRCA sheet, epoxy powder coated inside and outside and shall have hinged door with integrated locking arrangement and chrome plated handles. Powder coating thickness shall be 80 microns (min.) Jbs shall conform to IP55 degree of protection. The supply shall include the following items

Construction	: Welded
Size	: 60cm (Height) X 30cm (Width) X 50cm (Length)
Basic Frame	: Zinc Steel
Front Door	: Lockable
Standard Finish	: Powder Coating
Powder coating	

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Thickness : 80 microns (min.)
 Standard Color: Textured Grey
 Top & Bottom : Welded, with necessary ventilation and Cable entry cutouts on the bottom panel,
 Standard Mounting Option: Wall or Pole or Floor mounting brackets

Junction boxes shall be supplied along with canopy. Before executing supply, drawing shall be submitted by bidder for approval to NPCIL after approval only supply shall be executed.

Installation:

Scope includes excavation of pits, concreting with 1:2:4 mix, fabrication and installation of 65x65x6mm Ms angle frame, mounting bolts and other required accessories etc. The frame shall be painted with one coat of primer and two coats of epoxy paint.

Item No: 24. Single Mode SC/UPC to SC/UPC Optical Fiber Patch Cord Cable 1 Meter,

Connectors: SC (Square, Push-Pull) with UPC polish (blue connector body, no angle).

Fiber Type: Usually Single Mode (SM, G.652D, yellow jacket) for long distances,

Length: 1 meter (approx. 3 feet).

Jacket: Often LSZH (Low Smoke Zero Halogen) for safety or PVC.

Application: Connecting patch panels, routers, switches, or active devices in data centers, telecom, and home networks (FTTH).

Recommended make : Netlink/Syrotech/Optrotech

Item No: 25. 24 port Fiber distribution box

Item description	Expected value
Unit type	: Outdoor & indoor
Mounting type	: Wall/ pole mount
Max capacity	: 24 cores
Adapter type	: SC/APC
Splicing tray	: 12/24 fiber per tray
No. of adapter	: 24 (SC/APC)
Ports	: Minimum 3 ports for In, 24 ports for Out
Splitter	: 1*4 / 1*8/ 1*16 PLC splitter

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Insertion loss	:	≤0.35 dB
Return loss	:	≥50 dB
Plug durability	:	>1000 times
Insulation resistance	:	≥1000MΩ/500v (DC)
IP rating	:	IP65, IP66
Construction	:	ABS+PC material, UV resistant, shock resistant & waterproof
Environmental temperature	:	-40°C - +85°C
Environmental humidity	:	95% (at +40°C)
Suggested Make	:	Net link, Fober, Syrotech

Installation of 24 port Fiber distribution box:

Choose an installation location, usually on the wall or on a cable rack. The position should be at least 20 cm away from the cable exit, so as to leave sufficient space for storing the cable. Fix the fiber optic terminal box: Use expansion screws or other suitable methods to fix the fiber optic terminal box on the selected installation location.

Item No: 26. Single Band ONT Modem

PON Interface: G/EPON (GPON Class B+), SC/APC connector, 20km range.

LAN Ports: 1 Gigabit Ethernet (10/100/1000Mbps) + 1 Fast Ethernet (10/100Mbps).

Voice (POTS): 1 RJ11 port, supports G.711/G.729 codecs, T.38 Fax.

Wi-Fi: Single Band (2.4GHz), IEEE 802.11b/g/n, up to 300 Mbps, 2x2 MIMO, 2 external 5dBi antennas.

Wireless Features: Multiple SSID, WPA2-PSK security.

Network Features: Bridge/Router modes, PPPoE, VLANs, QoS, IGMP Snooping, Auto MDIX.

Physical: ABS Plastic, LED indicators (Power, LOS, PON, LAN, WiFi, POTS).

Power: DC 12V/0.5A or PoE.

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These single-band units are ideal for Internet Service Providers (ISPs) like BSNL in India, offering plug-and-play setup for FTTH (Fiber to the Home) connections, providing internet and landline phone services with reliable Wi-Fi coverage.

Recommended make : Netlink/Syrotech/Optrotech

Item No: 27. 12 Core OFC Distribution Box

Material	ABS
Usage/Application	Telecom
Number Of Ways	12 Way
No. of Doors	Single Door
MCB Count	TPN
Number of Ports/Pins	12
Model Name/Number	12 way FDB box
Color	Gray
IP Rating	IP57
Network Speed	Depend on the network.
Size/Dimension	12*11*8
Weight	450GM
Mounting Type	Horizontal
FDB	12 core FDB box
12 CORE FDB BOX	12 CORE
	Up to 866 Mbps1
Functionality Wireless Security	Wi-Fi Protected Access (WPA/WPA2)
	WPS (PBC)
Advanced Features	One-Touch Extender Setup

Item No: 28. 2.4GHz digital Cordless Telephone instruments

Frequency: 2.4 GHz (older standard, uses DSSS/FHSS for digital clarity).

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Technology: Digital Cordless, often with Digital Spread Spectrum (DSSS) or Frequency Hopping Spread Spectrum (FHSS).

Display: Large LCD (e.g., 1.8-inch) with backlighting, showing caller info.

Caller ID: Stores names/numbers 50 entries).

Phonebook: Stores contacts (e.g., 50-100).

Speakerphone: Usually 2-way (hands-free).

Battery: Rechargeable Ni-MH or Li-Ion, with 5-10 hours talk time & standby.

Power: Base unit can sometimes operate during power cuts.

Ringer: Adjustable volume (e.g., 6 steps) and customizable tones.

Keypad: Often illuminated for low light.

Dialing: Supports DTMF/FSK modes.

Functions: Mute, Flash, Redial, Hold, Alarm, Night Mode.

Type	Cordless Phone Set
Caller ID	Yes
Display	Yes
Display Size	1.8 inch
Speaker	Yes
Battery Type	Ni-MH Battery
Battery Qty.	2 x AAA
Wall Mount	Yes
Recommended make	Panasonic, Uniden, AT&T

Item No: 29. 6 core outdoor armored optical fiber cable-Single Mode (OS2)and laying through Pre lubricated HDPE pipe:

Kudankulam Nuclear Power Project	Construction of 203 Nos of Residential Quarters comprising of 40 Nos of E-type (G+10 floor-1 Tower), 80 Nos of D-Special quarters (G+10 floor-2 Tower), 80 Nos of B-type quarters (G+10 floor-2 Tower) and 3 Nos of F Type quarters (G+1 floor) at Anuvijay Township
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Single mode fiber (OS2) cable with Jelly filled loose tube (Multi tube) construction, CSTA (Corrugated Steel Tape Armour), provided with FRP (Fiber Reinforced plastic) Rod as strength members and outer HDPE jacket with sequential length marking suitable for direct burial cable/Outdoor ducts with minimum specifications as given below:

General specifications

Cable type	: Stranded loose tube
Construction type	: Armoured
Subunit type	: Gel-filled (Thixotropic gel)
Moisture barrier	: Flooding gel (Thixotropic gel)
Core wrapping	: Polyester tape
Armour type	: Corrugated steel tape (0.15mm minimum) CSTA
Outer sheath	: (≥1.8 mm) High density polyethylene, anti - termite, anti -rodent suitable for laying through PLB HDPE duct.
Number of fibers/ loose tube	: 6 cores
Fiber Strength	: Fiber Reinforced plastic (FRP)rod
Fiber Type	: Single mode Fiber (OS2)
Core Diameter	: 9 ±0.4 µm
Cladding Diameter	: 125 ±1µm
Coating Diameter	: 250 ±10 µm
Effective Group index of Refraction	: 1.468 at 1310 nm; 1.468 at 1550 nm
Fiber cut off wavelength	: ≤ 1260 nm
Overall diameter	: ≥ 11 mm and ≤ 16 mm (±0.5 mm)
Minimum Bend radius	: 20 X Outer Diameter
Tensile Strength	: ≥ 2500 N
Crush resistance	: ≥2000 N/10cm
Weight	: ≥120 (±10%) Kg/Km
Refractive Index Difference	: 0.36%
Polarization mode – dispersion co-efficient	: <0.5ps/sqkm @1310 nm & 1510nm
Core clad Concentricity	: ≤ 0.5 µm
Coating / Cladding non-circularity	: ≤12 µm
Min Proof Strength	: ≥0.70 (kpsi) Gpa
Numerical Aperture	: 0.14
Strain	: < 1%
Fiber Curl	: ≥ 4 meters radius of curvature
Zero Dispersion Wavelength	: 1313 nm
Zero Dispersion Slope	: ≤ 0.086 ps / sqnm-km
Max (chromatic) dispersion	: <5.3 ps/nm-km @1270-1340 nm

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<3.5 ps/nm-km @1285-1330 nm

<185 ps/nm-km @1550 nm

Attenuation

At 1310 nm, : ≤ 0.39 dB/Km

At 1550 nm, : ≤ 0.25 dB/Km

Environmental specifications

Installation Temperature : -20OC to +70OC

Operating Temperature : -20 OC to +70 OC

Storage Temperature : -20 OC to +70 OC

Standards

Tensile force test : IEC60794-1E1

Crush Resistance test : IEC60794-1-E3

Impact Resistance test : IEC60794-1-E4

Repeated Bending test : IEC60794-1-E6

Torsion Resistance test : IEC60794-1-E7

Kink Resistance test : IEC60794-1-E10

Bending Radius test : IEC60794-1-E11

Temperature Range test : IEC60794-1-F1

Sheath to ground Dielectric : IEC60794-1-F3

Strength Test

Water Penetration test : IEC60794-1-F5

Suggested Make: Commscope / Systimax /Panduit-Pan Net/TE-Amp/ADC Krone / R&M / Molex

Laying:

The cable shall be installed inside the 32mm diameter PLB HDPE pipe installed under this package along the route(s). Generally the cable shall be installed by compressed air blowing technique. However, for spans up to 150 meter, the Contractor can use pulling method for installation of OFC in PLB HDPE pipe. If any temporary manhole or hand hole is required for installation of OFC, the same will be done by the Contractor without any additional cost implication. Adopting pulling method for installation of OFC for spans more than 150 meter, shall be subjected to approval of the NPCIL. Contractor shall take into consideration of the following guidelines, for installation of OFC

- (i) The Optical Fibre Cable drums shall be handled with utmost care. The drum shall not be subjected to shocks by dropping etc. They shall not be normally rolled along the ground for long distance and when rolled, shall in the direction indicated by the arrow. The battens shall be removed only at the time of actual laying.

Kudankulam Nuclear Power Project	Construction of 203 Nos of Residential Quarters comprising of 40 Nos of E-type (G+10 floor-1 Tower), 80 Nos of D-Special quarters (G+10 floor-2 Tower), 80 Nos of B-type quarters (G+10 floor-2 Tower) and 3 Nos of F Type quarters (G+1 floor) at Anuvijay Township
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- (ii) A blowing machine in association with an appropriate compressor shall be used for blowing.
- (iii) Temporary blowing chambers (if required) shall be constructed and then backfilled after blowing operation is completed.
- (iv) Locations along the route, which provide easy access points for blowing machine and compressor, shall be determined.
- (v) Before starting the cable blowing, PLB HDPE pipe shall be checked for obstacles or damage.
- (vi) Always blow downhill wherever possible.
- (vii) Multiple blowing machines may be used in tandem if so required.
- (viii) Care must be taken not to violate the minimum bending radius applicable for the fiber optic cable. Tension in the cable during laying shall not exceed tension limit of the OFC.

While installing the cable, excess length of about 10 meters shall be provided at each joint location for each side. Excess length of 10 m shall be kept at one ends of road crossing, culvert crossing and bridges. However, exact excess lengths and manhole locations shall be finalized during detailed engineering and depending upon the site requirement.

Note:

Cable laying shall be done without any joint. Where ever cable laying is not possible without joint, contractor shall take prior approval from NPCIL for doing jointing of optical fiber cables.

Item No: 30. Dual Band ONT, 2.4GHz & 5GHz Wi-Fi Router

Function		Modem
Type		Wireless
Bandwidth		1200 Mbps
Frequency		Dual Band
Chipset		Realtek
Interface	PON	1 x GPON interface
	LAN	2 x 10/100/1000Mbps auto adaptive

Kudankulam Nuclear Power Project	Construction of 203 Nos of Residential Quarters comprising of 40 Nos of E-type (G+10 floor-1 Tower), 80 Nos of D-Special quarters (G+10 floor-2 Tower), 80 Nos of B-type quarters (G+10 floor-2 Tower) and 3 Nos of F Type quarters (G+1 floor) at Anuvijay Township
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		Ethernet interfaces,
		Full/Half,
		RJ45 connector
	WIFI	IEEE 802.11b/g/n/ac
		4T4R External antenna
		Support multiple SSID and MIMO
	POTS (downstream)	1 x RJ11 connectors
		Support: G.711A/G.711U/G.723/G.729 codec / T.30/T.38/G.711 Fax mode, DTMF Relay
	Optical	SC/UPC connector
Wavelength		TX 1310nm, RX1490nm
Operating Frequency	2.4 GHz	2.400-2.483GHz
	5 GHz	5.150-5.825GHz
PON Transmission distance		20 Km
Operating	Temperature	0°C~+50°C
	Humidity	10~90%(non-condensed)
Storage	Temperature	-30°C~+60°C
	Humidity	10~90%(non-condensed)
LEDs		PWR、LOS、PON、WAN、LAN1、LAN2、2.4G、5G、PHONE
Power Supply		≤10W

Kudankulam Nuclear Power Project	Construction of 203 Nos of Residential Quarters comprising of 40 Nos of E-type (G+10 floor-1 Tower), 80 Nos of D-Special quarters (G+10 floor-2 Tower), 80 Nos of B-type quarters (G+10 floor-2 Tower) and 3 Nos of F Type quarters (G+1 floor) at Anuvijay Township
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Power Adaptor		DC 12V/1.5A
OTHER INTERFACE		
SOFTWARE FUNCTION		
Management Mode	Support fully managed HGU function by Netlink ONT	
	OAM /OMCI, WEB, TELNET,TR069	
Data	Provides a full-speed non-blocking switch.	
	Features a 2K MAC address table and 64 full-range VLAN IDs.	
	Supports several VLAN features including QinQ VLAN, 1:1 VLAN, VLAN reusing, VLAN trunk, and more.	
	Integrated with port monitoring, mirroring, rate limiting, and SLA.	
	Auto-polarity detection for Ethernet ports (AUTO MDIX)	
	Integrated with IEEE802.1p QoS four levels of priority queues	
	Supports IPv4 IGMP and IPv6 MLD snooping.	
	Either Bridge, router or bridge-router mixed modes are possible.	
WiFi	Integrated 802.11b/g/n/ac standard	
	Support a maximum of 128 users	
	Authentication of WEP, WAP/WAP2-PSK(AES)	
	Types of modulation: DSSS、CCK and OFDM	
	Encoding scheme is BPSK、QPSK、16QAM and 64QAM	

Kudankulam Nuclear Power Project	Construction of 203 Nos of Residential Quarters comprising of 40 Nos of E-type (G+10 floor-1 Tower), 80 Nos of D-Special quarters (G+10 floor-2 Tower), 80 Nos of B-type quarters (G+10 floor-2 Tower) and 3 Nos of F Type quarters (G+1 floor) at Anuvijay Township
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POTS	Supports SIP call protocol and is seamlessly compatible with all popular call agents, including IMS.
	Integrates with the heartbeat function and supports active/standby call agents for improved reliability.
	Supports multiple voice coding options, including ITU-T G.711 / G.723.1 (5.3K/6.3Kbit/s)/G.729, and auto-negotiates with the call agent.
	ITU-T G.165/G.168-2002 echo cancellation up to 128ms
	High/low-speed, bypass and T38 faxing
	Supports Dial-up access for high-speed MODEMs (56Kbps)
	Supports RFC2833 and redundant RFC2833, difference rings, MD5 authentication, call forward, call waiting, hot-line calls, and alarm clocks
	Perform line testing according to GR-909 standards.
	Supports dynamic PPPoE/DHCP Client and static IP address assignment.
	Call loss is less than 0.01%.

Item No: 31. 24 core outdoor armored optical fiber cable-Single Mode (OS2) laying through Pre lubricated HDPE pipe:

Single mode fiber (OS2) cable with Jelly filled loose tube (Multi tube) construction, CSTA (Corrugated Steel Tape Armour), provided with FRP (Fiber Reinforced plastic) Rod as strength members and outer HDPE jacket with sequential length marking suitable for direct burial cable/Outdoor ducts with minimum specifications as given below:

General specifications

Cable type : Stranded loose tube

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Construction type	: Armoured
Subunit type	: Gel-filled (Thixotropic gel)
Moisture barrier	: Flooding gel (Thixotropic gel)
Core wrapping	: Polyester tape
Armour type	: Corrugated steel tape (0.15mm minimum) CSTA
Outer sheath	: (≥1.8 mm) High density polyethylene, anti - termite, anti -rodent : suitable for laying through PLB HDPE duct.
Number of fibers/ loose tube	: 24 cores
Fiber Strength	: Fiber Reinforced plastic (FRP)rod
Fiber Type	: Single mode Fiber (OS2)
Core Diameter	: 9 ±0.4 μm
Cladding Diameter	: 125 ±1μm
Coating Diameter	: 250 ±10 μm
Effective Group index of Refraction	: 1.468 at 1310 nm; 1.468 at 1550 nm
Fiber cut off wavelength	: ≤ 1260 nm
Overall diameter	: ≥ 11 mm and ≤ 16 mm (±0.5 mm)
Minimum Bend radius	: 20 X Outer Diameter
Tensile Strength	: ≥ 2500 N
Crush resistance	: ≥2000 N/10cm
Weight	: ≥120 (±10%) Kg/Km
Refractive Index Difference	: 0.36%
Polarization mode – dispersion co-efficient	: <0.5ps/sqkm @1310 nm & 1510nm
Core clad Concentricity	: ≤ 0.5 μm
Coating / Cladding non-circularity	: ≤12 μm
Min Proof Strength	: ≥0.70 (kpsi) Gpa
Numerical Aperture	: 0.14
Strain	: < 1%
Fiber Curl	: ≥ 4 meters radius of curvature
Zero Dispersion Wavelength	: 1313 nm
Zero Dispersion Slope	: ≤ 0.086 ps / sqnm-km
Max (chromatic) dispersion	: <5.3 ps/nm-km @1270-1340 nm <3.5 ps/nm-km @1285-1330 nm <185 ps/nm-km @1550 nm

Attenuation

At 1310 nm,	: ≤ 0.39 dB/Km
At 1550 nm,	: ≤ 0.25 dB/Km

Environmental specifications

Kudankulam Nuclear Power Project	Construction of 203 Nos of Residential Quarters comprising of 40 Nos of E-type (G+10 floor-1 Tower), 80 Nos of D-Special quarters (G+10 floor-2 Tower), 80 Nos of B-type quarters (G+10 floor-2 Tower) and 3 Nos of F Type quarters (G+1 floor) at Anuvijay Township
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Installation Temperature : -20OC to +70OC
 Operating Temperature : -20 OC to +70 OC
 Storage Temperature : -20 OC to +70 OC

Standards

Tensile force test : IEC60794-1E1
 Crush Resistance test : IEC60794-1-E3
 Impact Resistance test : IEC60794-1-E4
 Repeated Bending test : IEC60794-1-E6
 Torsion Resistance test : IEC60794-1-E7
 Kink Resistance test : IEC60794-1-E10
 Bending Radius test : IEC60794-1-E11
 Temperature Range test : IEC60794-1-F1
 Sheath to ground Dielectric : IEC60794-1-F3
 Strength Test
 Water Penetration test : IEC60794-1-F5

Suggested Make: Commscope / Systimax /Panduit-Pan Net/TE-Amp/ADC Krone / R&M / Molex

Laying:

The cable shall be installed inside the 50mm diameter PLB HDPE pipe installed under this package along the route(s). Generally the cable shall be installed by compressed air blowing technique. However, for spans up to 150 meter, the Contractor can use pulling method for installation of OFC in PLB HDPE pipe. If any temporary manhole or hand hole is required for installation of OFC, the same will be done by the Contractor without any additional cost implication. Adopting pulling method for installation of OFC for spans more than 150 meter, shall be subjected to approval of the NPCIL. Contractor shall take into consideration of the following guidelines, for installation of OFC

- (ix) The Optical Fiber Cable drums shall be handled with utmost care. The drum shall not be subjected to shocks by dropping etc. They shall not be normally rolled along the ground for long distance and when rolled, shall in the direction indicated by the arrow. The battens shall be removed only at the time of actual laying.
- (x) A blowing machine in association with an appropriate compressor shall be used for blowing.
- (xi) Temporary blowing chambers (if required) shall be constructed and then backfilled after blowing operation is completed.
- (xii) Locations along the route, which provide easy access points for blowing machine and compressor, shall be determined.
- (xiii) Before starting the cable blowing, PLB HDPE pipe shall be checked for obstacles or damage.
- (xiv) Always blow downhill wherever possible.
- (xv) Multiple blowing machines may be used in tandem if so required.

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- (xvi) Care must be taken not to violate the minimum bending radius applicable for the fiber optic cable. Tension in the cable during laying shall not exceed tension limit of the OFC.

While installing the cable, excess length of about 10 meters shall be provided at each joint location for each side. Excess length of 10 m shall be kept at one ends of road crossing, culvert crossing and bridges. However, exact excess lengths and manhole locations shall be finalized during detailed engineering and depending upon the site requirement.

Note:

Cable laying shall be done without any joint. Where ever cable laying is not possible without joint, contractor shall take prior approval from NPCIL for doing jointing of optical fiber cables.

Item No: 32. Wifi range Extender Dual-band 2.4 GHz + 5 GHz speeds of up to 1200 Mbps

Device Interfaces	802.11ac/n/g/b/a Wireless LAN
	10/100 Mbps Ethernet Port
	Reset Button
	WPS Button
LEDs	Status/WPS
	3 Segment Wi-Fi Signal Strength Indicator
Standards	IEEE 802.11ac
	IEEE 802.11n
	IEEE 802.11g
	IEEE 802.11b
	IEEE 802.11a
	IEEE 802.3ab
Antennas	Two external antennas
Data Signal Rate	2.4 GHz
	Up to 300 Mbps1
	5 GHz
	Up to 866 Mbps1
Functionality Wireless Security	Wi-Fi Protected Access (WPA/WPA2)

Kudankulam Nuclear Power Project	Construction of 203 Nos of Residential Quarters comprising of 40 Nos of E-type (G+10 floor-1 Tower), 80 Nos of D-Special quarters (G+10 floor-2 Tower), 80 Nos of B-type quarters (G+10 floor-2 Tower) and 3 Nos of F Type quarters (G+1 floor) at Anuvijay Township
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	WPS (PBC)
Advanced Features	D-Link One-Touch Extender Setup
Device Management	Supports QRS Mobile app for iPhone, iPad, iPod touch, and Android mobile devices
	Web UI
<u>Physical Dimensions</u>	97.9 x 50.7 x 48.7 mm (3.85 x 2.00 x 1.92 inches)
Weight	120 grams (4.23 ounces)
Power	Input: 110 to 240 V AC, 50/60 Hz
Temperature	Operating: 0 to 35 °C (32 to 95 °F)
	Storage: -20 to 70 °C (-4 to 158 °F)
Humidity	Operating: 10% to 90% non-condensing
	Storage: 5% to 95% non-condensing
Certifications	FCC
	IC
	CE2
	UL

Item No:33. 32 mm PLB HDPE pipe with necessary accessories.

The following paragraphs describe the functional requirements, major technical parameters.

PLB HDPE pipe shall be suitable for underground fiber optic cable installation by blowing as well as conventional pulling. The PLB HDPE pipe shall be suitable for laying in trenches by directly burying, laying through G.I./RCC Hume pipe and laying through trench less digging.

Note: The unit rates quoted in the price schedule shall be the composite price of PLB HDPE pipe along with all accessories.

Construction of PLB HDPE pipe

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The PLB HDPE pipe shall have two concentric layers viz. outer layer and inner layer. The outer layer shall be made of HDPE material and the inner layer of solid permanent lubricant. These concentric layers shall be co-extruded and distinctively visible in cross-section under normal lighting conditions and generally conform to IS-9938. In the finished PLB HDPE pipe, the coextruded inner layer of solid permanent lubricant shall be continuous and integral part with HDPE outer layer and preferably be white in colour. The inner layer of solid permanent lubricant shall not come out during storage, usage and throughout the life of the pipe. The pipe shall be supplied in a continuous length of 1000 (one thousand) meter in coil form, suitable for transportation, installation and handling purposes. The finished pipe shall be of good workmanship such that the pipe is free from blisters, shrink holes, flaking, chips, scratches, roughness, break and other defects. The pipe shall be smooth, clean and in round shape, without eccentricity. The ends shall be cleanly cut and shall be square with axis of the pipe.

General

The HDPE pipe shall conform to the following standard and the technical specifications described in the following sections.

- a) IS: 4984 / IS: 2530/IS: 14151/ (part1)/ IS: 9938/IS: 7328/IS12235 (Part-9)/IS: 5175
- b) ASTM D 1693/ ASTM D 638/ ASTM D 648/ ASTM D 790 / ASTM D 1712/ ASTM D 2240/ ASTM D 4565 / ASTM F 2160/ ASTM G 154
- c) TEC-spec no. GR/CDS-08/02/NOV-04(including all amendments)-HDPE pipe for use as duct for optical fiber cable.

Material

The raw material used for the PLB HDPE pipe shall meet the following requirements:

- (i) The anti-oxidant establishes, colour master batch and other additive used shall be physiologically harmless and shall be used only to minimum extent necessary to meet the specification.
- (ii) Usage of any additives used separately or together, should not impair the long-term physical and chemical properties of the PLB HDPE pipe.
- (iii) Suitable Ultra Violet stabilizers may be used for manufacture of the PLB HDPE pipe to protect against UV degradation when stored in open for a minimum period of 8 months.
- (iv) The base HDPE resin used for manufacturing outer layer of pipe shall conform to any grade of IS-7328.
- (v) In the inner layer of PLB HDPE pipe, the friction reducing, polymeric material to be used as the inner layer lubrication material shall be integral with HDPE layer. The lubricant materials shall have no toxic hazards for safe handling.

Dimension of pipe

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The nominal size of the pipe shall be 32mm and shall meet the following requirements.

- (i) Outside diameter 32 mm ± 0.4 mm
- (ii) Wall thickness 4 mm ± 0.2 mm
- (iii) Standard length 1000 meters ± 100 meter
- (iv) Thickness of permanent lubricant, > 0.4 mm
- (v) Maximum outer diameter of FO cable 15 ± 0.5 mm or cable dia whichever is that can be installed by blowing technique higher.

Accessories of PLB HDPE pipe

The following accessories are required for jointing the pipe and shall be supplied along with the pipe. No part of the accessories shall contain metal part and minimum pulling force of the coupler shall be 330kgf.

- i) **Push fit coupler:** The coupler shall be used to join two PLB HDPE pipes. The coupling shall be able to provide a durable airtight and watertight joint between two pipes without deteriorating the strength of the pipes. The strength of coupler shall match the primary strength of the PLB HDPE pipe and threaded coupler is not acceptable.
- ii) **End plug:** This shall be used for sealing the ends of empty pipe, prior to installation of FO cable and shall be fitted immediately after laying of the PLB HDPE pipe, to prevent entry of any unwanted elements such as dirt, water, moisture, insects/rodents etc.
- iii) **Cable sealing plug:** This is used to hold the cable and prevent entry of any unwanted elements, as specified above.
- iv) **End cap:** This cap is made of hard rubber, shall be fitted with both ends of PLB HDPE pipe to prevent the entry of any unwanted elements such as dirt, water, moisture, insects/rodents during transportation and storage.

Recommended make: duraline/Jain irrigation/kriti India/gamson India/Aspra industries

Laying of 32 mm PLB HDPE pipe with necessary accessories.

- (i) The Pipe shall be placed in trenches as straight as possible. Minimum bending radius of pipe and fibre optic cable shall always to be taken into account.
- (ii) The ends of pipes shall always be closed with end plugs to avoid ingress of mud, water or dust i.e. all pipe opening shall be sealed to avoid entry of foreign material.
- (iii) The pipes shall be joined tightly & properly through plastic couplers and the joint shall be smooth and free from steps. The joints shall be made properly so as to maintain the duct integrity even after. All joints shall be assembled with proper tools only.
- (iv) Coupler shall not be placed along the bend portion of the pipe.

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- (v) Cable sealing plugs shall be provided at all manhole locations and at locations cable is coming out of the pipe and empty pipe ends i.e. all pipe openings shall be sealed to avoid entry of foreign objects.
- (vi) PLB HDPE pipes shall be installed in a manner that fiber optic cable can be pulled, blown, de-blown without damaging the fiber optic cable due to stresses.

Recommended make: duraline/Jain irrigation/kriti India/gamson India/Aspra industries

Item No: 34. OFC Splicing

Splicing of the optical fiber cabling shall be minimized through careful planning. It is important that all splicing work be done under clean conditions. All optical fiber splicing shall comply with the following:

All fiber splices shall be accomplished through fusion splicing.

Each fiber splice shall be fitted with a splice protection sheath fitted over the final splice.

For splicing of each fiber, every effort shall be made to minimize the bidirectional average splice loss.

All splices and bare fiber shall be neatly installed in covered splice trays.

Average bi-directional splice loss at any particular splice shall not exceed 0.1dB but total bi-directional splice loss average of all splices in a link shall not exceed 0.05dB.

Fiber optic cable service loops shall be provided.

Supply of single mode Fiber Duplex patch cord, 2 meters

Item No: 35, Fiber Face Plate

Made of solid ABS plastic or flame retardant ABS

Modern design with small size and lightweight

2 adapter holder for easy installation

Equipped with dust-proof cap for unused port

Small size taking up minimal wall space

Size (mm)	86*86*24
Weight(kg)	0.052
Cable inlet/outlet	45695
Cable Dia (mm)	Φ3mm or 2*3mm
Max splice capacity	2 cores (single)
Suitable adapter	SC, LC

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Pressure Rating	2.5 - 16 kg/cm2

Item No: 36. Patch cord SC UPC to SC UPC 3 mtr

Item description	Expected value
Splicing type	: APC connector
Cable Length	: 3 meter
Type	: SC/SC Single-mode fiber
Insertion loss	: ≤0.2dB
Return loss	: ≥55dB
Repeatability	: ≤0.1dB
Temperature	: -40° to 80°C
Environmental space	: LSZH
Diameter on sheath	: 2mm
Cladding diameter	: 125nm
Mode field diameter	: 9nm

Suggested Make: Netlink/Syrotech/Optrotech

Item No: 37. 2F Single Mode Flat Drop (Easy Strip) Indoor / Outdoor Cable, (A2 type cable)

Item description	Expected value
Cable type	: FTTH drop cable (2 core)
Material shape	: Flat wire
Fiber type	: Single-mode G.657(A1/A2)
Outer jacket material	: LSZH
Strength member material	: FRP
Tensile strength (long/short term)	: 100/200N
Crush load (long/short term)	: 300/1000 (N/100mm)
Operating temperature	: -40°C to +85°C

Kudankulam Nuclear Power Project	Construction of 203 Nos of Residential Quarters comprising of 40 Nos of E-type (G+10 floor-1 Tower), 80 Nos of D-Special quarters (G+10 floor-2 Tower), 80 Nos of B-type quarters (G+10 floor-2 Tower) and 3 Nos of F Type quarters (G+1 floor) at Anuvijay Township
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Suggested Make : TE/Molex/R&M/Krone

laying.

While laying drop cable from rack maintained at apartment ground floor to each flat, drop cables should be laid without any physical damage. The minimum pulling tension allowable is of 150 Newton.

For laying of drop cable if pulling wire is to be used, it should be continuous throughout the pull. At the reel-end manhole/ hand hole, install the cable conduit. Attach the pulling wire or winch line to the cable using pulling hardware. When the drop cable enters the duct the pulling speed can be gradually increased. Use cable lubricant on the cable if required during the pulling. Terminate the drop cable at the FO box at each flat using splicing

Item No: 38. Patch cord SC UPC to SC UPC 20 mtr

Item description	Expected value
Splicing type	: APC connector
Cable Length	: 20 meter
Type	: SC/SC Single-mode fiber
Insertion loss	: ≤0.2dB
Return loss	: ≥55dB
Repeatability	: ≤0.1dB
Temperature	: -40° to 80°C
Environmental space	: LSZH
Diameter on sheath	: 2mm
Cladding diameter	: 125nm
Mode field diameter	: 9nm

Suggested Make: Netlink/Syrotech/Optrotech

Item No: 39. Supply installation of Dome Fiber Optic Splice Closure 24 Fibers Cable Joint Kit

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Basic Info.

Dome fiber splice enclosure is equipment that used for optical fiber cable splicing, joint and protection. It is waterproof and dust proof and suitable for outdoor aerial hanged, pole mounted, wall mounted, duct, buried application. It can be opened after sealing and can be reused without changing sealing material. dome type fiber optic splice closure is design and produced as per industry standard. It is suitable for fiber optical cable direct and branch splicing, connection protection.

Type: Fiber Optic Splice Closure

Max. Capacity: 24 or 48 Fibers

Fiber Optic Splice Tray: 1-4 PCS of Fost 3706 with 6 or 12 Fibers

Cable Entry and Size: 1 Large Oval Port with.ø20mm 3 Round Port

Size: 300X188(mm)

The strong housing provide fire resistant, waterproof and quakeproof while protecting splices during pulling, torsining and impacting

3. Design flexibility and high reliable sealing system

4. Cable sealing method: Heat Shrink Type

Application

1. It can be used in straight-through and branching application

2. It can be used in aerial, underground, direct buried, wall-mounting, hand hole and duct mounting application.

3. It can be mounted on a pole, wall or strand.

Suggested Make: Commscope / Systimax /Panduit-Pan Net/TE-Amp/ADC Krone / R&M / Molex

Installation of Fibers Cable Joint Kit

Mount to wall or pole using keyhole slots. If the bracket is being mounted vertically, make sure the arrow on the bracket is facing up.

Item No: 40. Jumper Wire 2X0.60mm, for Telephone main Distribution Box(MDF)

Cover Material	PVC
Type	Bus Cable Wire in MDF
Material Shape	Twisted pair

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Conductor Type	Stranded
Wire Core Material	Bare Copper Wire
Certification	CE, ISO, RoHS
Color	Blue , White or Orange, White
Inner Conductor	0.60mmcu
Nom. Thick	1.2mm PVC
Pairs	1 Pairs
Specification	Telephone Jumper Wire 2X0, 60mm

Item No: 41. 8-Port 10G Desktop/Rackmount Switch

Eight 10 Gbps Ports. 8x 10-Gigabit ports unlock the highest performance of your 10G/Multi-Gig bandwidth and devices, and provide up to 160 Gbps of switching capacity.

Lightning-Fast Connections. Provides lightning-fast connections to 10G NAS, Server, 10G PCIe Adapter/ NIC, gaming computer, 2.5G/5G/10G WiFi 6 AP, 8K video, and more.

Ideal for Various Scenarios. Built for lightning-fast connections in business and home offices, workstations, LAN parties, and home entertainment.

Optimal 5-Speed Connections. Auto-negotiation for 5-speed (100Mbps/1G/2.5G/5G/10G) connections provide optimal performance.

Wide Operation Temperature. Durable metal casing and a heat dissipating design guarantee a wide operation temperature (0–50 °C).

Plug and Play. Allows for easy deployment without the need for a technician.

Recommended Make: NetGear/ D Link/TP Link

Item No: 42. RG-6 T.V Coaxial cables

RG-6 style coaxial cable perfect for long distance composite and HD-SDI runs that require precision performance with analog or digital video signals.

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- Quality Construction — 18AWG solid center conductor and dual shield design consisting of aluminum braid and dual aluminum Mylar foil. Rugged and flexible with low attenuation.
- Universal Compatibility — Compatible with Kramer's compression connectors as well as typical crimp systems.

Material: Bare copper

Construction: 18AWG (1/18)

Diameter: 1.15 ±0.005mm

Material: Skin foam

Nom. Thickness: 1.77mm

Diameter: 4.57 ±0.15mm

Material: Dual-foil/mylar

Coverage: ≥125%

Material: PVC

Nom. Thickness: 0.76mm

Color: Dark gray

Outer Diameter: 6.95 ±0.19mm

Rated Voltage: 300V

Rated Temperature: 80°C

DCR (20°C): 152Ω/1000m

Capacitance (20°C): 53.pF/m

Recommended Make: finolex, delton, havells, comscope, R&M, RR Kabel

Laying

For laying of RG-6 T.V Coaxial cables cable to be pulled from Socket Box to Socket box inside of houses, pulling wire is to be used for laying, it should be continuous throughout the cable conduit. Each cable shall be tagged with numbers using Ferrules. Cables shall be tagged at their entrance.

Item No: 43. GPON OLT 4 PON

Compact design, meets various application scenarios.

4 port OLT Supports the deployment in diverse scenarios including low density areas, remote areas, sparsely-populated areas and industry parks. Supports FTTM and sharing site/rack with wireless base stations.

Small size and lightweight, easier to delivery and install

4 port OLT Small size and lightweight, easy to transport and install, Supports multiple installation modes, like limited room space basement, low-voltage room and small rack or cabinet.

Carrier-class security protection, support dynamic routing protocol RIP&OSPF, ensure the safe operation of network

Supports uplink redundancy protection including LACP STP RSTP and MTP. and support RIPEOSPF protocol. Supports Ink protection.

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Lower TCO

Netlink 4 port OLT dramatically saves on investment fees in trunk fires, pipe. Engineering, and facilities. Effectively reduce CapEx and OpEX.

GE/10GE	QTY	4
Uplink Port	RJ45(GE)	2
	SFP(GE)	/
	SFP+(10GE)	2
GPON Port	QTY	4
	Physical Interface	SFP Slots, Max splitting ratio $\leq 1:128$
Management Ports		1*FE out-band port, 1*CONSOLE port, 1*USB2.0,
		1*Type-C USB(For console, G2-B)
PON Port Specification	Transmission Distance	20KM
(Class C+++ Module)	GPON port speed	Upstream 1.244Gbps, Downstream 2.488Gbps
	Wavelength	TX 1490nm, RX 1310nm
	Connector	SC / UPC
	Fiber Type	9/125 μ m SMF
	Supported PON module level	Class B+, C, C+, C++, C+++
Weight	Net Weight	2.95kg

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(Single AC Power)	Gross Weight	4.15kg
Power Supply		AC:100~240V, 47/63Hz or/and DC:-48V,
		Double Power Module Hot Backup
Power Consumption		35W
Operating	Working Temperature	0°C ~ +50°C
Environment	Storage Temperature	-40 ~ +85°C
	Relative Humidity	5 ~ 90% (non-conditioning)
Management Mode		EMS, WEB, SNMP, Telnet , CLI
Recommended make		NET LINK, Syrotech, Optrotech

Item No: 44. Outdoor wall mounting Junction Box - 120 x 185 x 150 mm

IP Rating	IP67
Enclosure Material	ABS
Enclosure	Multipurpose
Type	Door with Locking
External Depth - Metric	120mm
External Height - Metric	185mm
External Width - Metric	150mm
Enclosure Material	Polycarbonate
Mounting Type	Wall Mount
Features	Dust-Proof, Corrosion Resistant, Impact-Resistant, Temperature Resistant

Kudankulam Nuclear Power Project	Construction of 203 Nos of Residential Quarters comprising of 40 Nos of E-type (G+10 floor-1 Tower), 80 Nos of D-Special quarters (G+10 floor-2 Tower), 80 Nos of B-type quarters (G+10 floor-2 Tower) and 3 Nos of F Type quarters (G+1 floor) at Anuvijay Township
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Item No: 45. Passive splitters (1:8)

Item description	Expected value
Port configuration	: 1:9
Operating wavelength	: 1260-1650nm
Insertion loss	: ≤16.9 dB
Uniformity	: ≤1.5 dB
PDL	: ≤0.3 dB
Directivity	: ≥55 dB
Pigtail type	: Loose tube
Connector	: SC/APC
Max Power	: 300mW
Lead length	: Minimum 1m
Package type	: Box, tube with bare ribbon, flat tube with 900µm fibers
Operating temperature	: -20° to 70°C
Suggested Make	: Net link, Fober, Syrotech

Item No: 46. Modular type Four Module T.V Coaxial socket (1 Socket and 3 Dummy).

Type: Coaxial TV Socket

Type of Module: Four

Number of module: One

Dummy closing: Three

Colour: White

Module Height: 50mm

Module Width: 25mm

Module Depth: 25mm

Base: metallic boxes

Base Size: Four Module

Module Finishing: grid plate and cover

Installation of the modular TV sockets termination of cables at socket/ floor junction box side is also covered under scope of the contractor. In the Two Module T.V Coaxial socket termination and finishing by grid plate and cover.

Recommended Make: MK blenze / Siemens / legrand /

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Item No: 47. PVC Casing & Caping 32mm – 2 meter

High-quality product designed to enhance the aesthetics and functionality of your space. This product is perfect for concealing and protecting electrical wires, ensuring safety and a neat appearance.

Length Per Piece (Metre)	2
Material	PVC
Class	Budget
Size	32 mm
Conduit Type	Casing Caps
Colour	Ivory
Recommended Make	Red Gold, AKG, MX

Item No: 48. Modular type Two Module T.V Coaxial socket.

Type: Coaxial TV Socket

Type of Module: Two

Number of module: One

Dummy closing: one

Colour: White

Module Height: 50mm

Module Width: 25mm

Module Depth: 25mm

Base: metallic boxs

Base Size: Four Module

Module Finishing: grid plate and cover

Installation of the modular TV sockets termination of cables at socket/ floor junction box side is also covered under scope of the contractor. In the Two Module T.V Coaxial socket termination and finishing by grid plate and cover.

Recommended Make: MK blenze / Siemens / legrand /

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Item No: 49, DI-9204E Digital Manual Call Point (MCP) (make: GST)

Re-settable (non-breaking glass) via special key

Advanced digital communication

Electronically addressing

Friendly installation and test

Wiring before termination

Surface mount, Semi-flush mount

LPCB Approved

Technical Specifications

Protection Rating: IP43

Operating Voltage: 24VDC

Operating Current:

Standby Current \leq 0.6mA

Alarm Current \leq 1.8mA

Operating Environment:

Temperature: -10°C~+55°C

Relative Humidity: 95%, non condensing

Application: Indoor use

Dimensions:

87.1mm×87.1mm×58.5mm (with back box)

87.1mm×87.1mm×23.5mm (without back box)

Item No: 50. Two loop control panel included 2 no of loop card, 2 No RS485 Network card and 2 No of 7AH/12V Battery for fire alarm system

- The Fire Alarm Control Panel shall be micro processor based fully Analogue Addressable, Analogue Control Unit which shall control all Analogue Addressable Detectors, Manual Call Stations and Switching Systems (for disconnecting AHU and power supply) connected to it.

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- All addressable units shall be connected to the FACP through the Loop Cards and shall be addressed through individual numbers. The FACP shall be able to obtain analogue value for all detectors in the circuit through a pulsed digitalized current data. The FACP shall be able to analyze all analogue inputs from all addressable units, and through its own software and ambient level screening the FACP shall be able to identify fire, possible fire or fault conditions. The unit supervision shall be dynamic and continuous.
- The FACP shall itself have one loop card built in. The loop shall be able to address minimum 99 addressable detectors & minimum 99 devices. At least minimum 99 FACP units may be networked to enhance system capacity as and when required. All the networked panels shall display all the events occurring anywhere in the system. Each FACP on the network shall effectively function as a repeater panel as well.
- The FACP shall also give adequate warning signal whenever there is dust accumulation in detectors, and up to the point of its replacement it should be possible to change the level of ambient alarm calibration condition either by the use of software program operable by the owner or by resetting the detector.
- Short / Open circuit units shall also be reported at the FACP In such cases, the system through the use of fault isolators shall be able to isolate that segment between the two fault isolators. The missing Detectors/Devices shall also be reported at the FACP with identification of the location.
- The FACP shall have the facility to set sensitivity of each smoke sensor remotely. It shall also be possible to set the sensitivity to a global high or global low based on night or daytime.
- When an alarm condition is sensed at the FACP from a smoke or heat detector, a delay time/alarm verification period shall be started. If the sensor is still in alarm after the delay time expires, an alarm condition is reported. The delay time shall be adjustable from 0 to 990 sec's.
- The FACP shall have the facility to perform walk test such that an operation can be periodically checked out for all initiating devices. As each device is placed into alarm the FACP shall print the condition and automatically reset the device. Audible devices shall be initiated, if required at a preprogrammed time. If a zone is inadvertently left in walk test mode, it shall automatically reset to normal after the idle time is exceeded. During the walk test the zones other than the programmed zones shall be under continuous supervision (normal mode). In case of any alarm initiated by detector/devices the walk test shall get terminated automatically.

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- Programming functions shall include alarm/trouble type assignment, point descriptor assignment, alarm message assignment, etc.
- Programming may be carried out from the FACP keyboard or utilizing the approved PC setup software via laptop/desktop computer.
- The FACP shall have a Liquid Crystal Display of Alphanumeric type to indicate immediately all conditions. The display shall be high resolution, backlit 2 (lines) x 40 character. In case of testing of the system from the FACP the Display shall be able to give readouts of analogue value of all detectors being tested. The FACP shall also be able to carry out continuous self-monitoring when in normal condition.
- The FACP shall have facility for in-built or external printer coupled to the FACP, which shall log all events with time. The printout shall clearly indicate the event - Fire/Pre Alarm/Fault etc. With the unit address and time.
- The FACP shall have ability to discriminate between false alarms and fire conditions, as well as priority selection of alarm in case alarm activates in two or more remotely located units simultaneously. In such cases, the Manual Call stations shall have the highest priority.
- The FACP shall actuate switches automatically in case of Fire condition that of AHU's and power supply.
- The System shall be fail safe and adequate safe guards should be under taken that in the event of a failure of a part of the System it shall not handicap the complete System. The Loop Cards shall be of Modular Construction.
- The Bidder shall undertake the responsibility of the complete installation, commissioning, user trials, training and maintenance of the System as required. The Bidder shall take all responsibility for preparation and installation of System Software into the FACP. The Software shall be such so as to be easily operated by the Client's Personnel and secured Software errors, ability to be upgraded so as to incorporate more features at a later date.
- The FACP shall have its own Battery Backup of a minimum of 16 hours in normal condition and then half an hour in alarm condition. The backup time calculation shall be done as per IS 2189 standard. The Battery shall be 2*12V (24V) DC and of sealed lead acid rechargeable maintenance free type, housed inside the FACP.
- It shall withstand temperature variations from 0° centigrade to 55° centigrade. Further, Relative Humidity (non-condensing type) up to 95% shall not hamper its performance. The

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voltage rating shall be from 15V DC to 32V DC, though the voltage may be change depending upon the working voltages of a proprietary FACP.

- The FACP shall be totally enclosed dust and vermin proof type made of minimum 16 gauge dust inhibited sheet with even baked finish. The FACP shall be of completely solid stage design.
- The logic circuitry shall be based on high noise immunity solid state hardware employing modular construction. Logic cards shall be of epoxy fiber glass construction.
- The FACP shall have any one of these approvals: EN 54: LPCB, UL and FM or as per IS 2189 (latest revision)/ NFPA
- The FACP shall have provision for interfacing with the Public Address System.
- The Panel should have a minimum of 20 zones and each zone shall have an LED to indicate independently fire and fault conditions on the panel fascia.
- The panel should have the facility to interface with an automatic two-channel programmable speech dialer for verbal reporting of fire. It shall be able to call four telephone numbers per channel. The programmable speech dialer shall have two alarm inputs and shall provide listen-in capabilities through the built-in microphone. The dialer shall have a built-in keypad for easy operation, programming and voice recording.

FIRE ALARM CONTROL PANEL TECHNICAL SPECIFICATION

Control Panel

Name	ZX2Se Control panel 1 to 2 Loop 230 Vac2 sounder circuits networking capability 400 X 400 X 135mm H X W X D included 2 no of loop card, 2 No RS485 Network card and 2 No of 7AH/12V Battery
Category	Addressable Panel, Fire, Networkable Panel, Products
Technical Information	
Number of Sounder	Circuits 2
Display & Graphics	
Display Type	LCD
Interfaces/Ports	
Serial	Yes
Battery Information	

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Battery Voltage	12 V DC
Power Description	
Input Voltage	230 V AC
Make	Morely/Honeywell/Ziton

Suggested Make : Morley Honeywell, Ziton, GSt, COOPER Fire]

Item No: 51. Multi Criteria Detector with base

Multi Criteria Detector Smoke detectors with base with the following specification

Colour	Ivory
Diameter	102 mm
Height	52 mm
Material of Rod	PC/ABS
Operating Temperature	-30 To 70 Deg C
Product Type	Photo-Thermal Multi Criteria Detectors
Voltage	15 - 32 VDC
Make	Morely/Honeywell/Ziton

Item No: 52. Fire Alarm system Repeater panel (Active panel)

The Active Repeater provides an extension to the operation of the fire alarm control panel with both controls and indicators. It displays the operational state of the control panel using the 80 character LCD display and the 7 LED status indicators.

Features

- Compatible with all Morley-IAS intelligent multiprotocol fire alarm control panels
- Connects to RS485 peripheral bus
- Backlit adjustable alphanumeric display
- General status LEDs
- Controls for system reset, accept, mute, silence alarms, and self test (active repeater only)
- "Access Enable" key-switch on active repeater

Type	Addressable
System Components	Fire Alarm Control Panel
Operating Current	90 mA (Quiescent) 120mA (Alarm)

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Operating Voltage	18 to 32 VDC
Weight	1.7 kg (approx)
Operating Temperature	+5 to 45 Deg C
Maximum Humidity	10% to 93% non-condensing
Suggested Make : Morley Honeywell, Ziton,GSt,COOPER Fire]	

Item No: 53, Hinged Cover For Manual Call Point of Morley & GST MCP'S.

Proven design – approved and certified to EN54-11
Secure and convenient Clip-On fit cover
Use of glass or resettable plastic element
Constructed of clear polycarbonate
Hinged cover, clip on unit
No installation required
Designed so there is no interference with the operation of the protected unit

Item No :_54. MANUAL CALL STATIONS

- I. The manual station shall be a press to break type. The device shall be red in color and suitable for surface or flush mounting. Manual stations shall be interfaced to an addressable input module that can be accommodated within the device. The manual station shall have normally open fire alarm and annunciator contacts and these contacts shall close on activation. Contacts shall remain closed until station is manually reset.
- II. The Manual Call Station shall be fully addressable with its own addressable module and operated by digitized signals from the FACP. The voltage range shall be from 15V to 32V.

MANUAL CALL POINT

Type : Analog Addressable, Resettable type
LED indication : Required
Operating Voltage : 15V - 32 V
Power consumption : < 250 Micro Amps
IP Rating : IP24D
Operating Temperature : -10°C to +50°C

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Relative Humidity : 93% ± 3%non-condensing

Operating Voltage : 15V to 30Vdc max

Suggested Make : Morley Honeywell, Ziton,GST,COOPER Fire]

Item No: 55, Hylam sheet (Size 6X4)

Thickness	6 mm
Size (inches)	6x4inches
Design Type	Plain
Usage/Application	Cabinets
Color	Red
Material	Hylam
Shape	Rectangle
Surface Finish	Plain

Item No : 56. SOUNDER/HOOTERS CUM STROBES

- 8.1 The sounder shall be Addressable Loop Powered electronic type and shall give discontinuous/ intermittent audible alarm whenever any detector or MCP operates.
- 8.2 The sound output from the Hooter should not be less than 85 decibels at the source point.
- 8.3 The sounder/Hooter shall be powered from either 2 wire detector loop or separate power supply 24 VDC can be used or additional cable shall be used in case of external power supply.
- 8.4 The horn/strobe shall be listed to UL 1971/ UL 464/LPCB and shall be approved for fire protective service as per IS-2189. The horn/strobe shall be wired as a primary-signaling notification appliance and comply with the Americans with Disabilities Act requirements for visible signaling appliances, flashing at 1 Hz over the strobe's entire operating voltage range. The strobe light shall consist of a xenon flash tube and associated lens/reflector

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system. The horn shall have three audibility options and an option to switch between a Temporal 3 pattern and a Non-Temporal (continuous) pattern. These options are set by a multiple position switch. On four-wire products, the strobe shall be powered independently of the sounder. The horn on horn/strobe models shall operate on a coded or non-coded power supply.

Suggested Make : Morley Honeywell, Ziton, GST, COOPER Fire]

Item No:57, GST I-9403 Addressable Sounder Cum Strobe, Make: GST

Carrier I-9403 Intelligent Sounder/Visual Indicator - 24VDC

I-9403 Intelligent Sounder Strobe is an audible and visual alarm device installed in field, which can be activated by fire alarm control panel in fire control centre. After activated, it will generate strong audible and visual alarm signal to warn people in field.

A 25.5mm high shallow base and a 40mm high deep base are available. The sounder strobe comes with the shallow base. The deep base C-94DB should be ordered separately.

Key Features

- Providing 16 tones
- Using ultra bright LEDs as source for light indication
- Optional transparent colourless lens (C-94WL) available
- Loop powered or external 24V powered
- Power-saving consumption mode and normal consumption mode (factory default)
- Single/dual address programmable
- Working modes: sounder & strobe / strobe only / sounder only
- Standard: EN 54-3

Item No: 58. 2 core1.5 Sq.mm FRLS cable.

Number of Cores : 2 Core

Conductor : Size 1.5 sq mm

Conductor : Material Copper

Insulation : Material PVC FRLS

Application : Fire Alarm System

Conductor Type : Multi Strand Flexible

For laying of 2 core1.5 Sq.mm FRLS cable to be pulled from loop starting to end of the Loop at Control Panel, pulling wire is to be used for laying, it should be continuous throughout the cable conduit. Each cable shall be tagged as Incoming/Outgoing at their entrance.

Recommended make: finolex, delton, Havells

Item No: 59. 20mm PVC Concealing Conduit with fittings:

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Material : PVC
 Size : 20 mm
 Color : Black
 Fire Resistant : Yes
 Shape : Round
 Application : Channelizing concealed & Surface wiring,
 Telecommunication, Cable ducting and construction
 Recommended make : Precision/AKG/Diamond

Installation of PVC Concealing Conduit with fittings:

- The 20 mm size conduits should be laid inside the slab concrete. Lay the conduits between the top and bottom reinforcement.
- Use only deep junction boxes in slabs. Properly bind the PVC conduits using the binding wire.
- It would be ideal to follow the color coding for conduits for PA system, Fire Alarm system and data such as LAN and telephone wire.
- Check the wall drops carefully and determine the concrete thickness.

Item No: 60. 25 mm PVC Conduit Pipe, Length : 3m

Best range of electrical pvc pipe 3m, pvc electrical conduit pipe, 25mm polycab pvc pipe,

Thickness	6 mm
Size	25 mm
Length of Pipe	3 m
Pipe Joint type	Sol fit
Type	Hard Tube
Material	PVC
Working Pressure	6 Kg/sqcm
Shape	Round
Is It Flexible	No
Length	3 meter

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Recommended Make	Aimson, AKG, Avonplast
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Item No: 61.. RS485 Serial port to Optical Converter

- Input Voltage 240 Volts
- Multi-Mode 2KM, Signal-Mode 20KM
- Supply Two Interface (RS485/422)
- 0-500Kbps The Highest Rate
- Fiber Wavelength: Multi-Mode 850nm, Signal-mode 1310nm
- SC type Connector
- RS-485 Signal : D+, D-, GND / RS-422 Signal : R+, R-, T+, T-, GND
- Multi-Mode 2KM, Signal-Mode 20KM
- Supply Two Interface (RS485/422)
- 0-500Kbps The Highest Rate
- Fiber Wavelength: Multi-Mode 850nm, Signal-mode 1310nm
- RS-485 Signal : D+, D-, GND / RS-422 Signal : R+, R-, T+, T-, GND

Item No: 62. Passive splitters (1:2)

Item description	Expected value
Port configuration	: 1:2
Operating wavelength	: 1260-1650nm
Insertion loss	: ≤4 dB
Uniformity	: ≤0.4 dB
PDL	: ≤0.2 dB
Directivity	: ≥55 dB
Test wavelength	: 1310nm/1550nm
Directivity	: ≥55dB
Fiber length	: ≥1m
Pigtail type	: Loose tube
Connector	: SC/APC
Max Power	: 300mW
Lead length	: 1m
Package type	: Box, tube with bare ribbon, flat tube with 900µm fibers

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Operating temperature : -20° to 70°C

Suggested Make : Fober, Syrotech

Item No : 63. 6U Network Rack

Rack Doors : Removable and revers able with see through toughened glass window Rack Sides : Perforated Removable with Slam Latch

Finish : Black, textured powder coated

Strength : Welded Construction 2 cable slots in top and bottom Optional caster base to for portable floor cabinet

Accessories:

- Cable Organizers
- Power Distribution Units
- Shelves
- Cooling Fans
- Rack ground Kit

Construction	Welded / CKD
Top & Bottom Cover	Welded to Frame with Cable entry exit cut outs
Front Door	Lockable Toughened Glass Door
19" Mounting Angle	Formed Steel
Std. Equipment Mounting	DIN Std. 10mm Sq. Slots
Standard Finish	Powder coated
Standard Colour	Grey & Off White OR Black
Rack Standard	Conforms to DIN 41494 or equivalent standard
Static Load	30Kg

Item No: 64. Passive splitters (1:4)

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Operating Wavelength(nm)	1260-1650
Pigtail Length(m)	1.2(±0.1) or customer specified
Fiber Type	SMF -28e or customer specified
Wavelength Dependent Loss(dB)	0.2
Temperature Stability(-40~85)(dB)	0.3
Packaging Size(L x W x H)(mm)	40x4x4
Size	1 x 16 cm
Color	White
Type	Optical Fiber PLC Splitter
Split Ratio	0.0444444444
Application	CATV, PON, FTTH, Broadband
Features	High Precision Steel Tube Type

Item No : 65 . 24 Port LIU (SC Simplex Fully Loaded)

- Type: 24-Port SC Type SM Loaded LIU with pigtails for single-mode fiber optic connections.
- Fiber Type: Supports single-mode (SM) fiber, ideal for long-distance, high-bandwidth applications.
- Ports: 24 SC-type ports for high-density fiber optic connectivity.
- Application: Perfect for large-scale fiber optic networks such as in data centers, telecom environments, or enterprise networks requiring high-performance and long-range connectivity.

Product Name	CommScope 24 Port SC Type SM Loaded LIU with Pigtails (2-2122145-3)
Model Number	2-2122145-3

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Type	Loaded LIU (Local Interconnect Unit) with SC Type connectors and pre-terminated pigtails
Ports	24 SC ports for fiber optic connections
Fiber Type	Single-mode (SM)
Port Configuration	Loaded with pre-terminated SC connectors and pigtails for faster installation
Port Type	SC Type (Subscriber Connector) for fiber optic connections
Cable Type	Single-mode fiber (SM)
Pigtails Included	Yes, pre-terminated pigtails included for easy fiber optic connections
Rack Type	19-inch rack-mountable
Mounting Type	Rack-mountable or wall-mountable
Dimensions (LxWxH)	19 x 1.75 x 12.5 inches (approx.)
Weight	7.0 kg (approx.)
Color	Black
Material	High-quality metal housing (typically steel or aluminum)
Installation	Easy-to-install with pre-terminated pigtails, quick fiber connections
Fiber Protection	Protects the fiber and ensures secure, safe connections
Applications	Ideal for data centers, telecom rooms, enterprise networks, and high-speed fiber installations
SC Connector	SC (Subscriber Connector) ports for secure, reliable fiber optic connections

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Pigtails Length	Typically 1-2 meters, ensuring flexibility during installation
Compatibility	Compatible with 19-inch racks or wall-mount racks
Max Cable Diameter	Typically supports cables up to 10mm in diameter
Cable Management	Designed to organize and secure fiber optic cables effectively
Fiber Optic Standards	SM (Single Mode) compliant with industry standards for long-distance, high-speed data transmission
Environmental Ratings	UL, RoHS compliant
Certification	Meets or exceeds industry standards for fiber optic cabling and interconnects
Ease of Use	Tool-free installation with pre-loaded modules for quick setup
Protection	Ensures the safety of fibers, minimizes stress and damage to cables

Item No : 66. Signage Board

Providing & installing in position of various size of sign boards made out of 3 mm thick "opaque" PVC foam board with computer cut, PVC non reflective self adhesive vinyl painted foam board. The scope also includes site survey, marking, fixing in required location.

For printing of signboards Words and sizes as below

1. Printed signage (IN CASE OF FIRE USE STAIR UNLESS INSTRUCTED OTHERWISE) Size:230mm(Height) X 300mm(Length)
2. Floor Identification signage's.(ie. GROUND FLOOR.....etc) Size:150mm(Height) X 600mm(Length).
3. Signage's of FIRE EXTINGUISHER. Size:100mm(Height) X 300mm(Length).
4. Signage's of ASSEMBLY POINT. Size:1200mm(Height) X 880mm(Length).
5. Signage's of Instruction of FIRE Action. Size:1200mm(Height) X 880mm(Length). **Comprising of the following**
 - A. ALERT THE SECURITY AT SECURITY ROOM BY ACTUATING MANUAL CALL POINT LOCATED AT STRATEGIC LOCATIONS.
 - B. EVACUATE THE OCCUPANTS BY USING FIRE EXITS AND EMERGENCY EXITS ONLY AND ASSEMBLE AT VARIOUS ASSEMBLY POINTS.

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- C. IF POSSIBLE TRY TO EXTINGUISH THE FIRE BY USING NEAREST / SUITABLE PORTABLE FIRE EXTINGUISHER OF WATER FROM NEAREST WETRISER.
 - D. BE CALM AND DO NOT GIVE ANY ROOM FROM PANIC, WALK, DO NOT RUN.
 - E. IF THE ENCOUNTER SERIOUS DIFFICULTY IN EVACUATION. FLAT AND TRY TO ATTRACT ATTENTION OF RESCUE TEAM.
6. Signage's of Instruction of FIRE ORDER. Size:1200mm(Height) X 880mm(Length).
Comprising of the following
- ACTION BY SECURITY / RECEPTION UPON RECEIPT OF INFORMATION THROUGH PUBLIC ADDRESS SYSTEM.
 - A. ALERT THE OCCUPANTS BY USING PUBLIC ADDRESS SYSTEM.
 - B. INFORM THE CONTROL THROUGH ANY ONE OF THE PHONE NUMBERS:.....
 - C. REFER EVACUATION PLAN FOR EVACUATING ONLY STANDARD PEOPLE
 - D. GUIDE THE FIRE FORCE ON THEIR ARRIVAL, TO THE SEAT OF FIRE.
 - E. IN CASE OF ANY CASUALTIES CALL AMBULANCE BY DIALING NUMBER:.....FIRE FIGHTING AGENCY.....PHONE:..... FIRE PROTECTION ENGINEERS FAX:.....

Item No: 67. Excavation and refilling for laying of Underground Telephone Cable and HDPE Pipe laying for OFC cable

The scope of excavation in any type of soil and refilling the excavated trench with excavated soil and leveling after cable laying, also shall be laid on and covered with sand/riddle.

After laying of cable sand to be placed in bottom and top of the cable then bricks to be placed on the top of the cable (crosswise) with proper care. Brick shall be good quality Burnt Clay bricks conform to IS 12894 and shall got approved by the ENC. The nominal size of bricks shall be approximately 230 x 110 x 80 mm.

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CHAPTER : XXXXI

INTERNAL FIRE PROTECTION WORKS

1.0 INTRODUCTION

- 1.1 This specification covers the Supply, Manufacture, Assembly, Storage at site, Installation, Hydrotesting and handing over of Fire Protection Systems Wet risers cum down comer with all attachments like Mono block pumps with all accessories, Pipe, Pipe fittings, Valves, Hydrants, Fire brigade connection inlet, Fire Hoses & Nozzles, Hose reel Drums, Hose boxes , fire extinguishers etc. for multistoried buildings at Anuvijay Township including obtaining NOC FROM RESPECTIVE GOVERNMENT AUTHORITIES. The payment towards obtaining NOC is borne by the contractor

This specification forms a part of the Tender documents and shall be read in conjunction with the same.

- 1.2 Bidders shall inspect the site of the proposed work before submission of bids. All items of equipment shall be supplied complete in all respects and any item not covered in the specification but essential for proper Design, Operation and maintenance of the system shall be included by the Tenderer in his offer.
- 1.3 The Tenderers shall state in clear terms whether they are Professionally qualified or they have employed qualified sub-contractor to undertake the work.
- 1.4 All items or equipment / *System shall comply with the latest regulation and stipulations of applicable* statutory bodies of Government of India and the Government of Tamil Nadu, wherever applicable.
- 1.5 The Equipment / System shall also confirm to the latest Indian Electricity Rules as regards Safety, Earthing and other essential provisions specified therein for installation and operation of electrical equipment and plants.
- 1.6 All working parts, in so far as possible, shall be arranged for convenience of operation, inspection, lubrication and ease of replacement with minimum “down time”.

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- 1.7 Workmanship and materials shall be of good quality suitable for the purpose intended and in accordance with the highest standards and practices.

2.0 **STANDARDS.**

- 2.1 The Fire Hydrant installation, shall confirm to and meet with the requirements set out by the followings:

1. IS:1642 – Fire safety of buildings (General) : Details of construction – code of practice.

IS:1641 - Code of practice of fire safety of buildings (general) :

2. IS:3844 – Code of practice for installation of internal Fire Hydrants and hose reels on premises.

3. IS:1239 part 1: – Steel tubes and tubular products – specifications – part-1 steel tubes.

4. IS:1239 part-2: specification for steel tubes, tubulars and other steel fittings.

5. IS:3589 – Steel pipes for water and sewage (168.3 to 2540mm outside diameter) – specification.

6. IS1879 - specification for malleable cast iron pipe fittings.

7. IS: 636/ BS6391 - Fire Fighting Delivery hose

8. IS: 903: 1984 - Fire hose delivery couplings branch pipe and nozzles

9. IS: 5290: 1983 - Landing valves (Internal & external) Hose cabinets Custom-built from MS sheets as per specification.

- 10.IS: 15301 - Installation & Maintenance fire fighting pumps.

- 11.Hose cabinets : Custom Built from MS sheet as per specification.

- 12.TAC's applicable documents governing to this system

- 13.Fire protection Hand Book, National Fire Protection Association (NFPA)

14. Schematic sketch for overall scope as attached to this chapter.

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Apart from above, the installations should confirm to International Standards like NFPA Standards, and also Compliance of Directions, if any, of Local Fire Brigade. Latest editions of above codes and standards shall be applicable for this work.

3.0 Scope of Work:

3.1 NPCIL scope :

NPCIL scope of work is limited to the issue of schematic diagram of the fire protection system for multistoried buildings for erection of piping / equipments & release of work front in phased manner.

3.2 Scope of work of contractor:

The Contractors' scope of work comprises of:

1. Supply of Pipe, Pipe fittings, mono block pumps with motor of required rating (terrace pumps), DOL starter, cables required for electric supply to the motor, valves, support material, fasteners, fire hoses, hose reel drums, Fire extinguishers, etc., as per the drawing, specification and standards .
2. All flanged components shall to be supplied along with matching flanges and fasteners.
3. Supply of consumables for painting, primer & finish paints of NPCIL approved brand & colour.
4. Supply of welding consumables, fixtures & accessories, welding electrodes of NPCIL approved brands.
5. Supply of anchor fasteners of NPCIL approved brand, wherever required.
6. Preparation of work schedule, procedure & Progress reports.
7. Cleaning, fabrication and erection of pipe, pipe fittings, valves and supports and finish painting of the erected system.
8. Cleaning, fabrication and erection of fire hoses with cabinets, hose reel drums, Fire extinguishers, etc and supports and finish painting of the erected system
9. Earth excavation, Backfilling, concrete / masonry pedestals, foundation etc., if any, required for supporting or installing the equipments.
10. Non destructive examination (NDE) of weld joints & erected pipe lines – pressure & leak testing etc.
11. Preparation & submission of reports and completion certificates.

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4.0 DRAWINGS AND REFERENCE DOCUMENTS.

The fire water system along with fire extinguisher can be referred from the drawings enclosed in section 6 of this tender. However overall scope is as shown in the schematic sketch attached to this section.

The work shall be carried out as per the drawings and specifications and IS codes indicated in the drawings. Discrepancy, if any, in the drawings shall be brought to the notice of NPCIL before commencement of the work. In case of any dispute on specification & standards, this chapter shall be followed.

5.0 Specification for material:

The contractor shall supply and erect the fire water risers cum down comer along with terrace pump and all other accessories required as per this tender specification.

5.1 TERRACE PUMPS & Accessories

Mono block pump (Terrace Pump) with motor of required rating :
TEFC type, 900 LPM, 45 M head, 50 Hz, 3 phase, class 'F' insulation,
IP 54 protection and starting on DOL.

Control panel for terrace pump set :

Pump to make ON & OFF manually and to start automatically, with
indicating lamps and other accessories.

1.1 KV grade PVC insulated, PVC sheathed, 10 sq mm, armoured
copper cable for Terrace pump , pressure switches etc. (Suitable sizes
from control panel, pressure switches to motor etc.), with earth
connection suitably connected to the building earth electrode.

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5.2 FIRE HYDRANTS, HOSE & HOSE REEL

Fire Hydrants and Hose Reels shall be provided internally and externally as shown in the drawings. Internal Hydrants & Hose Reels shall be provided at each landing of an escape staircase.

5.3 Fire Hydrant (Landing Valve)

Fire Hydrant (Landing valves) shall be single headed S.S Valve as per IS:5290, Type A ,with ISI mark. Each fire hydrant valve shall be supplied along with blank cap & chain, matching flange, bolt, nuts, washers & gaskets as required for its erection.

5.4 Fire Hose

Non Percolated fire hose with stainless steel male & female end coupling wound with copper wire , suitable for using on Hot surfaces, shall be as per IS:636 (Type B) with ISI mark.

5.5 Hose reel drums

Hose reel drums shall be of 22" size with 30.0 mtr long braided rubber hose of 25 NB and ABS nipple, conforming to IS:884, with suitable bracket for fixing on the wall. Side Plates shall be powder painted finish with post office red.

Hose reel shall have integrated automatic stop valve which will open after 2 revolution of the reel.

- Threaded Inlet connection shall be of 25 NB or 20 NB.
- Outlet connection for hose shall be able to rotate for left and right direction
- Maximum working pressure 15Bar, test pressure 20bar

Hose reel drums with hose shall be properly housed in a suitable cabinet made out of 2mm thick ms plate.

5.6 Branch pipe with nozzle shall be conforming to IS: 903, of Stainless steel

5.7 Hose cabinet

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Each hydrant shall be provided with a fire hose Cabinet suitable to accommodate two non percolated fire hose with male female coupling, of 15mtr length, 63 mm dia and one short pipe with nozzle, fabricated out of 2 mm mild steel. Hose boxes shall have proper hose holding integrated device to keep the hoses and branch pipe with nozzle inside the box. Each box shall be powder painted finish with post office red. Each hose box shall have fixing clamps properly welded to the box.

Each Hose reel drums with hose also shall be properly housed in a suitable cabinet made out of 2mm thick ms plate and shall be powder painted finish with post office red.

5.8 **Portable fire extinguishers**

DCP fire extinguisher and foam type fire extinguisher as per IS 15683 also shall be supplied and erected at the locations indicated in the drawings

5.9 **Valves:**

1. **Butterfly Valves :**

All butterfly valves required for wet risers shall be of cast iron body (wafer type or flanged type), PN 16, (class 150) conforming to IS: 13095, Disc Stainless steel, Seat black nitrile, shaft SS - 304, PTFE bearing, EPDM / Neoprene 'O' ring and hand lever operated. Each valve shall be supplied along with matching flanges, bolts, nuts, washers and gaskets required for its erection at site.

2. **Non Return Valve**

All non return valve shall conforming to IS: 5312, flanged end, swing type, cast iron body PN16 (class 150) conforming to IS: 5312. Each valve shall be supplied with matching flanges, bolts, nuts, washers & gaskets required for its erection at site.

3. **Ball Valves**

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All ball valves required for wet risers shall be of Forged steel body with Screwed ends / Flanged ends, 150 class, conforming to IS:9890 shall be of full bore or reduced bore pattern and either one piece or split construction.

5.10 Pressure gauges

Burdon tube direct mounting type, 15 NB screwed, 100 mm dial size, brass socket & element material, pressure range 0 to 21.0 kg/cm², fitted with suitable isolation valve.

5.11 Pressure switches

Suitable for automatic start at line pressure < 2.0 kg/cm² at terrace level and stop at requisite pressure. Pressure switch shall have a suitable cut-off valve.

5.12 Pipe , Pipe Fittings, Flange & Fasteners :

Pipe	: IS 1239 (part-1), Heavy grade, seamless
Fittings	: IS 1239 (Part-2), seamless
Flanges	: IS 6392
Bolts , Nuts & Washers	: IS 1367, grade 4.6 or above
Gasket	: EPDM/Neoprene Rubber

6.0 Material Handling & Storage:

The Contractor shall be responsible for transportation of all the items / material from Contractor's store / shop to the place of work/ installation, storage/preservation of items till they are taken-up for erection, during erection and until handing over of the system. Preservation shall be done as per the instructions of the Engineer in charge and no extra claims on this account will be entertained. Dragging of materials on the ground shall not be permitted.

7.0 Welding of Pipelines & Supports

- Welding consumables (electrode) for welding CS pipe to CS pipe /supports are in the scope of the contractor.
- Welding electrodes of NPCIL approved brand only are to be used for the work.

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- Welding related tools and tackles are in scope of the contractors (welding machine, grinding machine.etc.)
- Cleaning the weld edge preparation by using suitable cleaning agent like acetone etc. is in scope of the contractor.
- Contractor shall deploy qualified welder for this jobs who can do both piping welding as well as structural welding. Qualifying the welder is in the scope of the Contractor.
- The contractor shall have a mother oven for baking of electrodes and portable oven for carrying electrode to work site.
- Test certificate for electrodes shall be submitted to the Engineer for information.

All Piping systems shall be fabricated, installed, flushed, and tested in accordance with specification and applicable Codes / Drawings.

7.1 All pipes shall have ends beveled for welding with a bevel angle of $37.5^\circ \pm 2.5^\circ$. The Fit-up of Joints for welding shall be made properly and carefully using line-up clamps, with a uniform root spacing to facilitate the production of sound welds and to avoid misalignment. Tack welds may be used to hold the edge to welded in line. All welding activities shall be completed as per the approved welding procedure.

7.2 The following methods of inspection for the weld joints shall be applicable:

Visual inspection:

- Fit up - 100%
- Root weld - 100%
- Final Weld - 100%

Contractor shall employ a qualified (Level-II or higher ISNT/ASNT) inspector for the inspection of weld joints.

8.0 Surface Finish

The finished surfaces of all the welded joints may be flush with the base material or may have any reasonably uniform crowns. The weld reinforcement shall not exceed the specified limits of the referencing code.

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9.0 FABRICATION AND ERECTION OF PIPELINES

Cleaning, pre-fabrication / fabrication:

Beveling or edge preparation shall be done by grinding or any other suitable method. All pipes spools are to be cleaned from inside before joining for fit-up and erection. Gaskets of required size are to be provided by the contractor and same shall be deemed to be the part of the erection job

- The term “Pipe Line” shall comprise all pipes, pipe fittings, valves, Fire Hydrants, vents and drain connections, flanges, gaskets, nuts, bolts, etc. Threaded pipe nipples wherever required will be machined and supplied by contractor without any extra cost.
- All piping equipment etc. shall be erected and joined or welded, utilizing materials in accordance with the working documentation supplied by the engineer.
- Pipeline shall be made with the minimum feasible number of joints. All erected pipe line shall be supported with structural steel supports as per the drawings / specification issued by the Engineer. Structural materials conforming to IS:2062, like MS plates, angles, channels, beams, ‘U’ bots, clamps etc shall be arranged by the contractor.
- All completed pipe lines, after hydrotest, along with all attachments, shall be painted with two coat of post office red synthetic enamel paint of NPCIL approved brands over a coat of primer (Inorganic zinc silicate). Final DFT shall not be less than 200 microns.

Pipe line surface shall be suitably prepared for receiving the primer by grid blasting to surface finish SA 2 1/2, etc., including cost of filler primer, paint etc all complete as per specifications and as directed by Engineer in charge

- Immediately after receipt of drawings, contractor shall prepare isometric drawings with weld joints identified (shop & field) and submit the same for the approval of Engineer. The work shall be commenced only on receipt of approved isometric drawings.

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- Provide sufficient details required to prepare shop drawings, the Contractor shall obtain the Engineer's consent in writing, to design the additional details and prepare the shop drawing from the design drawings issued to him.
- The quantities given in the drawings are tentative only. Contractor shall work out the requirement based on the site condition. If any addition or deletion in quantity, the same shall be brought to the notice of the Engineer. The procurement of additional quantities shall be in the scope of contractor without any change in the quoted rates.

Any surplus material including scarp generated after completion of whole work shall be the property of the contractor.

On completion of all erection activities, 'as built' drawing of the erected system indicating all erected components and shall be submitted for the approval of the Engineer prior to hydrotest. This drawing shall be considered as the hydrotest circuit.

- Necessary Temporary supports for erection of pipes shall be arranged by contractor at no extra cost.
- Whenever required, providing adequate lighting for piping erection etc. shall be done by the contractor.
- Valves erection is included in piping erection rate itself. No separate rate is available for this. The pipeline shall be welded to matching flanges and bolted with proper bolts, nut & gaskets and tightened to the required torque.
- The engineer shall have the right to amend the existing and issue additional specifications whenever the need arises. All such specifications, whether in the form of technical specification, drawing, instructions or procedures will be issued within the provision of the contract documents.

10.0 Quality assurance

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Contractor shall ensure the workmanship of desired quality. QA plan shall be submitted for the approval of NPCIL. Stage inspection shall be done by the contractor's QA personnel as per approved QA plan. Inspection by NPCIL representative shall also be carried out as per the QAP. The contractor shall ensure that QAP is strictly implemented by informing NPCIL and taking clearances as per QAP.

11.0 HydroTesting of Erected System

The entire erected system shall be tested in accordance to IS: 3844, During hydrotest period, an inspection of the system shall be done to check that no leakage of water is taking place at any of the joints or landing valves and the pressure in the system does not drop by more than 50 kPa (0'5 kgf/cm²g).

Hydrostatic / water fill, testing is included in contractor's scope of work. Contractor shall arrange for all the resources required for successful execution of these tests. Clean filtered potable water shall be used for hydro test.

- System shall be drained and dried properly, all temporary arrangement removed and cleaning / mopping of the surrounding area shall be carried out after hydro test.
- In case any circuit needs to be pressure tested more than once, in view of leaks and defective material supplied, re-testing and pressurization will be in the scope of the contractor and no extra payment for this will be made.
- Incase additional vent points are required, same shall be provided by the contractor with the approval of the engineer-in-charge and after testing these points are to be cut and blanked without any extra cost.
- Commissioning and Test Running of the system shall be carried out in the presence of Fire & Safety personnel of KKNPP.

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- 12.0 The contractor is deemed to have considered all the above activities in his quoted price and no extra claim shall be entertained for not understanding the erection methodology.

Fabrication and erection of supporting elements and structural fixtures wherever required and pointed out by the Engineer, in order to prevent vibration, excess sag, etc., shall be carried out by the Contractor.

13.0 GRIT BLASTING & PAINTING

13.1 Grit blasting

Grit blasting of the pipe surfaces shall be carried out wherever primer is to be applied (newly) to meet the surface finish requirements of painting Manufacturer as given below, by blowing dry air to remove the dust etc.

Grit blasting shall be carried out to meet the surface finish requirement of coating manufacture but shall not be less than the surface finish requirements of Swedish standard SA 2 ½.

Grit blasting shall be done using shots or with iron grits. Blasting shall be done using manual blasting arrangements. The grits shall be of grade GP 25/ GP16 (0.7 To 1.18 mm).

13.2 PAINTING

Painting shall be done as per the following table. Final DFT shall not be less than **200** microns.

The painting system offered for corrosion protection of external surfaces of Pipes & equipments shall meet the following technical specifications. The system offered shall be complete including various components such as primer, thinner, painting/coating material and any other material required to provide a

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complete system which can provide corrosion protection meeting technical requirements as indicated in the table below:

Sl.No.	Name of the paint (Final Coat)	Approved paint Manufacturers	Primer	Intermediate	Application method & Number of coats above primed surface (Minimum)	Cleaning of pipe Equip surface
1	Synthetic enamel Post office fire red	Berger paints, Asian paints, Shalimar paints, Goodlass Nerolac, Akzo noble	Inorganic Zinc silicate	As recommended by the Paint manufacturer	Brush (2)	Cleaning of intermediate coated surface

Surface
cleaning
before

application, after grit blasting - shall be done using thinner /solvent/air blasting/ other means as per paint manufacture recommendation & tender specification

Paints whose shelf life has expired shall not be used for the painting

All Equipments, Plants & machinery, paints and consumables required for grit blasting and painting shall be in the scope of the Contractor. The rate quoted shall inclusive of all.

Underground MS Pipe, if any, shall be wrapped with pipe coat or equivalent polymer based corrosion protection tape with the approval of engineer-in-charge . The Pipe shall be wire brushed to remove mill scale and an approved compatible primer shall be applied before the tape is spirally wound, with an overlap of 15mm. Acceptance of wrapping is subject to successful peel-off test in the presence of NPCIL personnel. The process of wrapping shall be carried in accordance with IS:10221 and the wrapping material shall be in accordance with IS:15337.

14.0 RECORDS:

The Contractor shall maintain records pertaining to the quality of the work and examination / Inspection in compliance with all drawings and technical requirements. The record shall be in a proper format as indicated by the Engineer. The Contractor shall submit the copies of such reports to the Engineer on completion of each activities and

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prior to submitting bills for progressive payments. The report concerning welding, alignment, erection of pipes, valves, flanges etc are included in this.

For material supplied by the Contractor , the Contractor shall forward one copy of test certificate pertaining to the origin and specification of material. All the material supplied shall bear co-relating identification with the respective test certificate.

The Contractor shall have a system of record to facilitate easy traceability of all records.

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Schedule of Material

Note: The following list of material is for understanding the scope by the tenderer . The work shall be completed as per the requirements of the drawing. All the materials required for the completion shall be arranged by the contractor irrespective of that the material is listed below or not.

Sr No	Description	Unit (Each Building)	G+10 Bldg - 1 No of riser per building
1	Pipe 150 NB, IS:1239, Heavy Grade, seamless	Mtr	60
2	Pipe 80 NB, IS:1239, Heavy Grade, seamless	Mtr	10
3	Pipe 20 NB, IS:1239, Heavy Grade, seamless	Mtr	33
4	150 NB 90 deg BW elbow, IS:1239, seamless	No	06
5	150x80 NB Ecc Reducer, IS:1239, seamless	No	01
6	150x65 NB Con reducer, IS:1239, seamless	No	01
7	20 NB 90 deg elbow, IS: 1239, seamless	No	33
8	150 NB BF valve with matching flanges & fasteners	set	2
9	80NB BF valve with matching flanges & Fasteners	Set	1
10	150 NB, Non return valve, IS: 5312	No	01
11	20 NB Ball Valve screwed end	No	15

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12	2 way fire brigade connection	No	01
13	20 NB Air Release valve		
Sr No	Description	Unit (Each Building)	G+10 Bldg - 1 No of riser per building
14	SS Fire Hydrant valve with matching flanges & fasteners	Set	12
15	Non percolating Fire Hose with SS end coupling bound with copper wire, 15 mtr long	No	24
16	Hose reel drum with braided rubber hose , 30.0 mtr long with shut - off nozzle	No	11
17	Fire Hose box, fabricated from 2.0 mm thick MS plate to accommodate Two hose of 15.0 mtr long and one short pipe with nozzle.	No	12
18	Hose reel box, fabricated from 2.0 mm thick MS plate to accommodate the hose reel of 30.0 mtr long..	No	11
19	Short pipe with nozzle	No	12
20	Fire Extinguisher DCP pressure stored ABC type 4.0 Kg	No	11
21	Fire Extinguisher DCP pressure stored BC type 4.0 Kg	No	11
22	Fire Extinguisher Foam type 9.0 Ltr	No	1
23	Supply, Fabrication, Erection , grit blasting & Painting of Structural steel supports	MT	0.10
24	Supply of approved paints, Grit blasting, cleaning of pipe surface and applying paints on erected system. Final DFT not less than 200 microns.	Sq Mtr	30

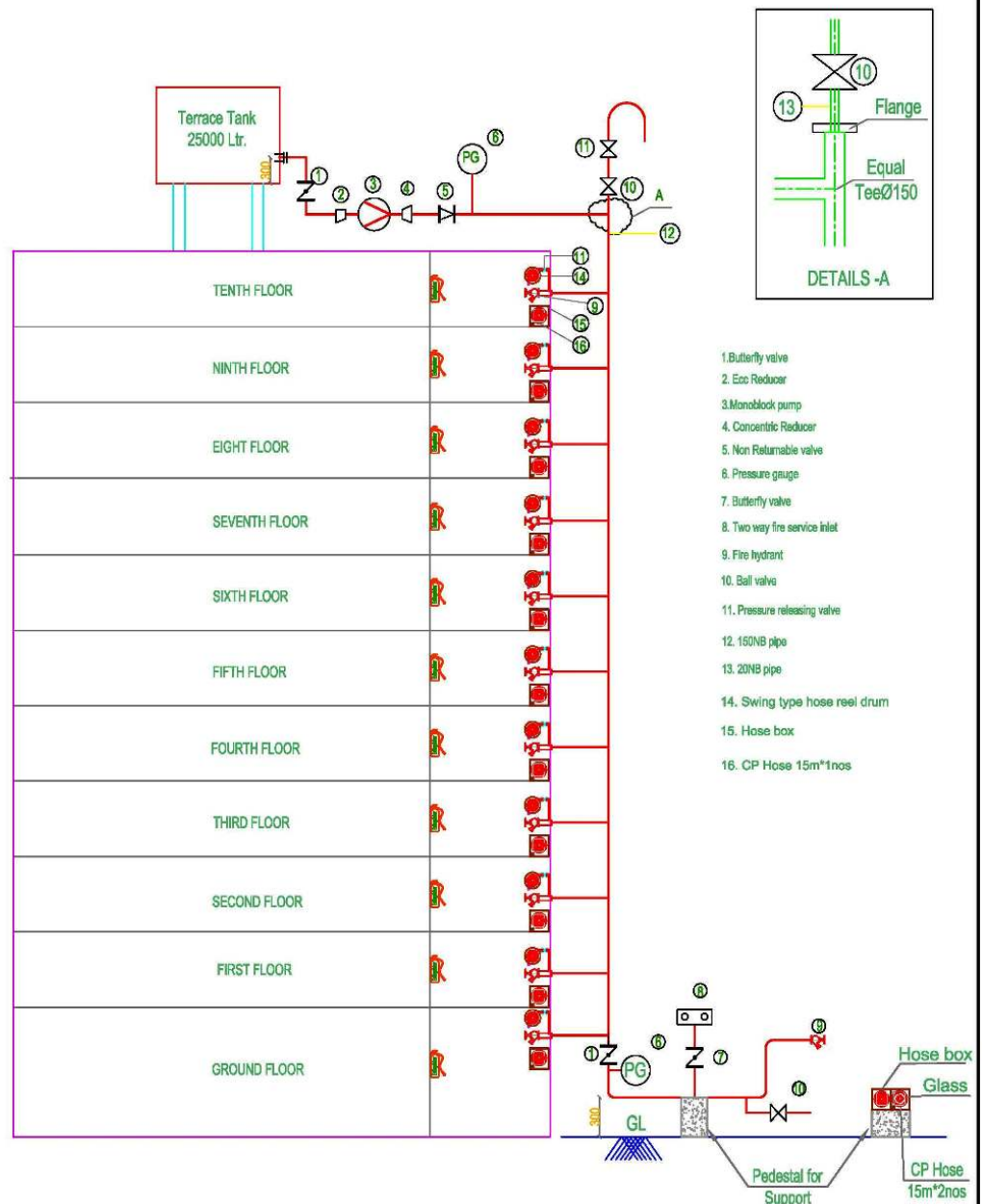
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25	Supply of mono block pump (Terrace Pump) with motor of required rating, TEFC type, 900 LPM, 45 M head, 50 Hz, 3 phase, class 'F' insulation, IP 54 protection and starting on DOL. Including DOL starter.	No.	01
Sr No	Description	Unit (Each Building)	G+10 Bldg - 1 No of riser per building
26	Control panel for terrace pump set. Pump to make ON & OFF manually and to start automatically, with indicating lamps and other accessories.	Set	01
27	1.1 KV grade PVC insulated, PVC sheathed, 10 sq. mm, armoured copper cable for Terrace pump , pressure switches etc.(Suitable sizes from control panel, pressure switches to motor etc.), with earth connection suitably connected to the building earth electrode.		As required
28	Pressure gauge, $\phi 100$, 0 to 21 Kg/cm² fitted with suitable isolation valve.	No	02
29	Pressure switch to start pump automatically at pressure < 2.0Kg/cm² fitted with suitable cut-off valve.	No	01
30	150 NB SOFF Flange, 150#, IS:2062	No	02

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MULTISTORIED BUILDING – SCHEMATIC DIAGRAM

MULTI STORIED (G+10) BUILDING FIRE PROTECTION ARRANGEMENT(SCHEMATIC)



MODE OF PAYMENT

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Contract rate shall be for each unit, based on the completion of the above works. However, 10% of payment shall be released after submission of NOC from Government authorities.