



INDIAN INSTITUTE OF TECHNOLOGY KHARAGPUR
KHARAGPUR, WEST BENGAL 721302

E -TENDER DOCUMENT

for

***Supply, Installation, Testing & Commissioning of 2X21 TR Air Cooled Inverter Scroll
Type water chilling AC at ATDC-1,E&ECE Dept. of IIT Kharagpur***

Notice Invitation Tender Serial No. NIT No. IITKGP/RAC/ATDC-1/2026-27/1 DATED 28.04.2026

Tender Serial No. _____ Issued to:

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1. NOTICE INVITING TENDER**1.1 INTRODUCTION**

Indian Institute of Technology (IIT) Kharagpur, hereinafter called IITKGP, invites online tenders from the eligible contractors for **Supply, Installation, Testing & Commissioning of 2X21TR Air Cooled Inverter Scroll Type water chilling AC at ATDC-1,E&EC Dept. of IIT Kharagpur**

1.2 PARTICULARS

1.NIT Number	IITKGP/RAC/ATDC-1/2026 -27/1
2.Name of Work	Supply, Installation, Testing & Commissioning of 2X21TR Air Cooled Inverter Scroll Type water chilling AC at ATDC-1,E&EC Dept. of IIT Kharagpur
3.Location of Work	MEMS Lab, Ground floor E&ECE Department.
4.Estimated Cost(including GST)	Rs. 30,87,961.00/- (Rupees Thirty Lakhs Eighty Seven Thousand Nine Hundred Sixty One Only)
5.Earnest Money Deposit	Rs. 61,760.00/- (Rupees Sixty One Thousand Seven hundred Sixty only)
6.Time Limit	120 days from Date of start.
7.Tender Basis and Mode	Two stage (Technical Bid & Financial Bid)
8.Mode of Payment to IITKGP(EMD/Tender fee)	<p>i) Original Demand Draft/Pay Order has to be submitted physically at the office of RAC Unit on or before the due date/extended date of opening of bid & Scanned copy of Demand Draft/Pay Order has to be uploaded on https://eprocure.gov.in/eprocure/app</p> <p>ii) Demand Draft/Pay order to be drawn in favour of IIT KHARAGPUR payable at Kharagpur.</p> <p>iii) EMD shall be valid for 60 days from date of opening.</p>
10. Pre bid meeting	6TH May,2026, 11:00hrs, in the Meeting Room of RAC Unit in the Old building , IIT Kharagpur
9.Closing Date & Time for Receipt of bids	21th May,2026 up to 12:00hrs
10.Date & Time for Opening Technical of Bid	22nd May,2026 up to 12:00hrs
11. Date & Time for Opening of Price Bid	To be informed later to the successful bidder
12. Engineer-in-charge and contact details.	Mr. S. Banerjee, Executive Engineer(RAC) Tel: 03222-282724 Email: sbanerjee@adm.iitkgp.ac.in
13. Address for tender issue, submission and opening	Office of RAC Unit,1 st Floor, Old Building, IIT Kharagpur, Kharagpur WB 721302
14.Website for full and updated publishing information	https://eprocure.gov.in/eprocure/app https://www.iitkgp.ac.in/tenders
15. Website for tender submission & processing (This is e-Tender only submission by Online)	https://eprocure.gov.in/eprocure/app

1.3 ELIGIBILITY CRITERIA

1.3.1 The bidder must be registered in appropriate class of works with Government organization like CPWD/ PWD/ MES or PSUs or those having experience in similar nature of works awarded by Government / Semi Government Organizations/ Government Funded Autonomous Organization.

1.3.2 The bidder must have done at least 1 (ONE) similar work of value of 80% of the estimated cost for HVAC works **or** 2 (TWO) similar works for projects each of value 60% of the estimated cost for HVAC works **or** 3 (THREE) similar work for projects each of value 40% of the estimated cost for HVAC Works with Government/Semi-government/ PSU/ Government Funded Autonomous Organization during last **7 (seven) years** preceding last date of the month of tender submission.

1.3.3 The Bidder should have registered Sales & Service office in West Bengal with adequate manpower. List of tools and tackles and resume of the workmen may be provided in the technical BID. Firm should have full-fledged service set up in West Bengal along with trained team of technical staff (Detailed Organization Chart Needs to be submitted) & Should have own warehouse in West Bengal, to ensure constant & immediate supply of spare parts at all times. Organization chart of the service set up should be furnished duly signed by authorized signatory.

Note:

The estimated cost is Rs. **30,87,961.00/-** (Rupees Thirty Lakhs Eighty Seven Thousand Nine Hundred Sixty One Only)

1.3.3.1 The value of executed works shall be brought to current costing level by enhancing the actual value of work at simple rate of 7% per annum; calculated from the date of completion to the last date of receipt of applications for tender.

1.3.3.2 **Similar works** shall mean *SITC OF DX AC System*.

1.3.4 The bidder or the specialized agency the bidder intends to associate with must be registered with appropriate government authority as a bonafide business entity and must have GST registration certificate and Permanent Account Number of income tax.

1.3.5 The validity of the registrations and licenses should be valid as on the date of tender submission.

1.3.6 Average annual turnover of the bidder as per ITCC (Income Tax Clearance Certificate) or profit & loss statement shall not be less than 30% of the estimated cost, not having incurred loss in more than two years, during last 5 years ending 31 Mar 2025.

1.3.7 **The bidder other than OEM shall get specific authorization letter from the OEM (Signed by officer of OEM representative in the rank of Regional manager/ Zonal Head or business head) for quoting this particular NIT. The copy has to be submitted along with the tender in the form of hard copy and soft copy as well.**

1.3.8 The scope of HAVC shall include following civil and electrical work , these are non-billable

- Opening /Closing / Making hole in existing Masonry wall/ Concrete / Glass structure to facilitate entry and exit of duct / pipe work and finishing it good.

1. All above work shall be executed and finished good to the satisfactory of Engineer in charge.

Sd/-

Superintending Engineer (E&M)

On behalf of the **Director, Indian Institute of Technology Kharagpur**



Copy to:

- 1) Dean , Infra EEC
- 2) Asso. Dean ,Infra EEC
- 3) HOD(E&ECE Department)
- 4) Sec. to Deputy Director
- 5) Sec. to Dean Admin.
- 6) Executive Engineer(RAC)
- 7) Sr Asst. Engineer/Assistant Engineer/ Junior Engineer (RAC)
- 8) Notice Board
- 9) Tender Notice uploaded to CPPP portal & Institute Website
- 10) Office file



2. INFORMATION TO BIDDERS

2.1 SCOPE OF WORK

The IITKGP intends for **Supply, Installation, Testing & Commissioning of 2X21TR Air Cooled Inverter Scroll Type water chilling AC at ATDC-1, E&EC Dept. of IIT Kharagpur**

- 2.1.1 The vendor shall work out execution sequence and methodology so as to complete the project within the envisaged time and the estimated cost, duly handling the constraint mentioned above.

2.2 GENERAL INSTRUCTIONS

- 2.2.1 Bidding documents are to be obtained electronically through websites: <https://eprocure.gov.in/eprocure/app>
- 2.2.2 <https://www.iitkgp.ac.in/tenders>; *ii)* <https://eprocure.gov.in/eprocure/app>
- 2.2.3 This bid document shall be read in conjunction with GCC (General Conditions of Contract) available on <https://www.iitkgp.ac.in/tenders>
- 2.2.4 The bidder shall visit and inspect the site and obtain all information on his own responsibility and at own cost, which may be necessary for the purpose of quoting and submitting the tender. No excuse or ignorance as to site conditions and local information shall be accepted after awarding of the contract. Access to the site will be granted by the Engineer-in-charge on all working days within working hours.
- 2.2.5 IITKGP shall not provide any space at site for labour hutments.
- 2.2.6 All clarifications about the tender shall be sought by bidder on or before pre-bid meeting. The bidders may make suggestions which shall be considered during the Pre Bid Meeting. Intending bidder(s) may also send their queries or suggestion, if any, through e-mail to the Engineer-in-charge on or before **6th May, 2026, 10:30hrs**. No queries shall be entertained after notification of replies to noteworthy queries received till the date of pre-bid meeting.
- 2.2.7 Completion certificate issued by Competent Authority will only be considered as credential. If the Completion certificate issued by Competent Authority does not reflect the type of work, then Final bill / Schedule of Quantity of the qualifying works also to be attached along with the Completion certificates. Certificate from private individuals / organizations for whom such works have been executed shall not be accepted.
- 2.2.8 The bidding document (consisting of specifications, the schedule of quantities of various types of items to be executed, the set of terms and conditions of the contract and other documents / drawings, if any), Addendum/Corrigenda, Clarifications to Pre-bid queries can be downloaded from the websites: i) <https://eprocure.gov.in/eprocure/app>
- 2.2.9 <https://www.iitkgp.ac.in/tenders> ; *iii)* <https://eprocure.gov.in/eprocure/app>. Corrigenda, if any shall be published only on these websites *at any time before the closing time of tender*. The institute shall not be responsible for any delay / difficulties / inaccessibility of downloading facility for any reason whatsoever. *The tenderers who have downloaded the tender documents from website must visit the website and ensure that such addendum(s)/corrigendum(s) (if any) is also downloaded by them. This shall be the responsibility of the prospective registered bidders to check the web site for any such corrigendum/addendum before closing time of tender and ensure that bid submitted by them are in accordance with all the corrigendum's/addendums.*
- 2.2.10 All costs, charges & expenses that may be incurred in connection with the preparation of his tender shall be borne by him and the Institute accepts no liability whatsoever therefore.
- 2.2.11 Rates quoted by the bidders shall be inclusive of GST (Goods and Services Tax - Central, State and Interstate) and all applicable taxes. Income Tax and all other statutory deductions like labourcess etc. will be deducted from the bill as per prevailing rules.
- 2.2.12 Exemption to IITKGP against any tax/ duty/ fee/ surcharge/ charge/ cost, if any, found applicable or sought later from IITKGP after award shall be passed on to IITKGP by the contractor without dispute.
- 2.2.13 IITKGP reserves the right to reject any or all of the bids without assigning any reason.
- 2.2.14 **Bid Validity:** Bid shall remain valid for 120 days from the date of submission.
- 2.2.15 **Firm Price:** Bidder's quoted Rates/Prices for executing the activities under the Contract shall remain firm till completion of the entire work & shall not attract any escalation under any circumstances whatsoever.
- 2.2.16 If any information furnished by the bidder is found as false / fabricated, then his bid will be rejected and treated as cancelled. Even if such manipulation is detected at any stage after signing of the contract, it would lead to termination of the contract besides forfeiture of Earnest Money Deposit and liabilities towards prosecution. In such cases the bidder will be debarred from participation in future tendering process in IITKGP for next 05 (Five) years.
- 2.2.17 **Earnest Money Deposit (EMD)** of requisite amount and that in prescribed mode or proof of payment thereof shall be submitted with the Technical Bid explained in following section.



2.2.18 **Refund / Conversion of Earnest Money Deposit:** The Earnest Money received shall be refunded to the unsuccessful bidders without any interest upon executing the Contract Agreement by successful bidder. The Earnest Money Deposit of successful bidder shall be retained and converted into part of Security Deposit.

2.2.19 **Forfeiture of Earnest Money Deposit:** Earnest Money Deposit will be forfeited in any of the following cases:

2.2.19.1 The bidder withdraws / modifies his tender during the period of Bid Validity.

2.2.19.2 The bidder, in case of tie between lowest bids, refuse to submit revised offer.

2.2.19.3 The bidder does not accept the correction of arithmetical errors of his tender.

2.2.19.4 The bidder fails to deposit Performance Guarantee and information as per format given in GCC within the stipulated time period before award of the work.

2.3 SUBMISSION OF TENDER

2.3.1 Help for Contractors, FAQ, Information about DSC and Bidders Manual Kit containing the detailed guidelines for e-Procurement system are also available on Central Public Procurement Portal.[<https://eprocure.gov.in/eprocure/app>]

2.3.2 It is mandatory for all the bidders to have a valid **Class-II/Class-III Digital Signature Certificate (in the name of person having power of attorney to sign the Bid)** from any of the licensed Certifying Agency (Bidders can see the list of licensed CA's from the link www.cca.gov.in) to participate in e-Procurement of IIT KHARAGPUR.

2.3.3 It is mandatory for the bidders to get their firm /company registered with e-procurement portal <https://eprocure.gov.in/eprocure/app> to have user ID &password.

2.3.4 Tender documents will be available online on website <https://eprocure.gov.in/eprocure/app> which can be downloaded free of cost.

2.3.5 Bidders may download and refer the "Instructions for Online Bid Submission" from (<https://eprocure.gov.in/eprocure/app;jsessionid=2A56E178EED5C7D8536175EFBB573C9F.eprocgep2?page=HelpForContractors&service=page>).).

2.3.6 The tender documents shall be submitted online in the prescribed format given on the websites and technical bids received online shall be opened as per NIT or Corrigendum thereof. No other mode of submission is acceptable. Detailed credentials as per the requirement of eligibility criteria and all tender papers except Bill of Quantities are to be submitted in "Technical Bid"

2.3.7 Bill of Quantities with rates duly filled in are to be submitted in the format provided online in the name of "Financial Bid". Hence, physical submission of the documents is limited to submission of MSE registration certificate as per provision given in sub-clause 1.2.7 of NIT & 2.2.15 of Information to Bidders.

2.3.8 Representative of the bidder, who chooses to attend, may attend the online opening of the technical bids on the scheduled date and time of Bid opening. However, such representatives shall be allowed to attend the opening of the Technical Bids, only, if such person presents the letter of authority issued in his name by the bidder on his letterhead.

2.3.9 Bidders cannot submit the tender after the due date and time of e-bid submission. Time being displayed on Central Public Procurement Portal <https://eprocure.gov.in/eprocure/app> ("Server System Clock Time") shall be final and binding on the bidder. e-Bids are required to be submitted by bidders, only as per the Indian Standard Time (IST) and not the time as per their location/country.

2.3.10 The bidders are advised to submit their e-bids well before the e-bid due date. IIT KHARAGPUR shall not be responsible for any delay in submission of e-bids for any reason including server and technical problems.

2.3.11 The Technical and Financial Bid shall be digitally signed by the Authorized Signatory of the bidder & submitted "on-line" only. The authorized signatory of the bidder must be in possession of Power of Attorney before submitting the digitally signed bid. Scanned copies of various documents can be prepared in .pdf file format.

2.3.12 Any tender received without original Earnest Money in the form as specified in clause 1.2.8 of tender documents shall not be considered and shall be summarily rejected.

2.3.13 IIT KHARAGPUR reserves the right to cancel the tenders before submission/opening of tenders, postpone the tender submission/opening date and to accept/reject any or all tenders without assigning any reason thereof. IIT KHARAGPUR's assessment of suitability as per eligibility criteria shall be final and binding.

2.3.14 Tenderers may note that they are liable to be disqualified at any time during tendering process in case any of the information furnished by them is not found to be true. EMD of such tenderers shall be forfeited. The decision of IIT KHARAGPUR in this regard shall be final and binding.



2.4 EVALUATION OF BIDS AND AWARD OF WORK

- 2.4.1 The Bid of bidder will be opened electronically on the specified date and time of opening at the Office of RAC Unit, 1st Floor, Old Building, IIT Kharagpur, Kharagpur WB 721302 in the presence of willing bidders or their authorized representatives.
- 2.4.2 Date, time and place of opening of Financial Bid will be informed after evaluation of Technical Bid to the Technically Qualified Bidders.
- 2.4.3 Bids shall, first, be checked for payment of **Earnest Money Deposit**. Only those bids found to have duly paid/ submitted Earnest Money Deposit shall be considered for evaluation.
- 2.4.4 Evaluation of **Technical Bid**: The bids received will then be assessed on the eligibility criteria mentioned at Para 1.3 of Noticing Tender. Bids found not meeting the eligibility criteria shall be considered **non-responsive and shall be rejected summarily**
- 2.4.5 IITKGP retains the right to revert back to individual bidders with further clarifications / queries on the Technical Bid. The bidder has to respond to the queries within the specified time mentioned in the covering letter.
- 2.4.6 On the date & time specified for opening of Financial Bid or the Revised Financial Bids as the case may be will be opened on specified date and time.
- 2.4.7 **EVALUATION OF Financial Bids**: The Financial Bid should contain the complete bid document with duly filled in Schedule of Financial Quote. Financial Bids opened as above will be checked for arithmetical errors.
- 2.4.8 The successful bidder shall be issued Letter of Acceptance (LOA) of the bid, and be required to furnish a Performance Guarantee as per General Conditions of Contract, Program Schedule with specific Milestones to be achieved as to complete the work within the stipulated time limit and details of his Technical Staff to be deployed as per ANNEXURE-I
- 2.4.9 **Letter of Award (Work Order)** shall be issued to the successful bidder only after receipt of the Performance Guarantee, along with Program Schedule and the details of Technical Staff to be deployed for the work.
- 2.4.10 **Agreement (Contract)** consisting of complete tender document including conditions, bill of quantities, technical proposal and specialized services, drawings, if any, and acceptance thereof together with any correspondence leading thereto, shall be drawn and signed with the awardee after issue of Work Order.
- 2.4.11 **Date of start** of work shall be reckoned from 10th day from the date of issue of "Letter of Acceptance".
- 2.4.12 **Defect Liability Period (DLP)**: In partial modification to clause no.16 of General Conditions of Contract (GCC), the Defect Liability Period shall be **12 months** after the certificate final or otherwise of its completion of work or till the final bill has been prepared.
- 2.4.13 **TERMS OF PAYMENT**:
- a. 70% towards supply of materials at site.
 - b. 20% towards installation.
 - c. 5% towards successful commissioning and handing over with all test reports and as-built drawings approved by IIT Kharagpur.
 - d. 5% towards retention amount till the completion of Defects Liability Period.



3. UNDERTAKING BY THE BIDDER**U N D E R T A K I N G**

I / We have read and examined the Tender document including terms & conditions, specifications, bill of quantities, drawings and designs, general rules & directions, General Conditions of Contract, Special Conditions of Contract and all relevant other documents, publications and rules referred to in the Conditions of Contract and all other contents in the tender documents for the work.

I / We, hereby tender for execution of the work specified for the Indian Institute of Technology Kharagpur within the time specified and in accordance in all respects with the specifications, designs, drawings and instructions in writing.

We agree to keep the tender open for 120days from the last date of its submission and not to make any modifications in its terms and conditions. A sum of Rs. _____ has been deposited in cash/ demand draft of a scheduled bank as earnest money. If I / we, fail to furnish the prescribed performance guarantee within prescribed period, I / we agree that the said Director, Indian Institute of Technology Kharagpur or his authorized officer shall without prejudice to any other right or remedy, be at liberty to forfeit the said earnest money absolutely. Further, if I / we fail to commence work as specified, I / we agree that the Director, Indian Institute of Technology Kharagpur shall without prejudice to any other right or remedy available in law, be at liberty to forfeit the said earnest money and the performance guarantee absolutely, otherwise the said earnest money shall be retained by him towards security deposit to execute all the works referred to in the tender documents upon the terms and conditions contained or referred to therein.

Further, I / We agree that in case of forfeiture of earnest money or both Earnest Money & Performance Guarantee as aforesaid, I / We shall be debarred for participation in the re-tendering process of the work.

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.

Seal & Signature of Contractor

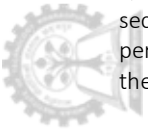
Postal Address

Dated

Witness

Address

Occupation



ANNEXURE-I

TECHNICAL STAFF OF CONTRACTOR

DISCIPLINE	NAME	QUALIFICATION	EXPERIENCE	CONTACT NUMBER
Overall Project In-charge				
Engineer - Structure and Civil Works				
Engineer – Electrical & Mechanical Works				
In-charge - Safety, Health & Environment				

Seal & Signature of Contractor



UNDERTAKING FOR GCC COMPLIANCE

UNDERTAKING

We hereby undertake that we shall fulfill all the terms & conditions within the specified time frame, after the acceptance of our offer in case our offer is accepted; failing which IIT KHARAGPUR may go ahead to take necessary action such as reporting the non-compliance to appropriate Government authorities and barring us from future participation in IIT KHARAGPUR works.

Seal & Signature of Contractor



DATED:

Bid Security Declaration Form

Date: _____ Tender No. _____

To (Insert complete name and address of the purchaser)

I/We, The undersigned, declare that :

I/We understand that, according to your conditions, bids must be supported by a Bid Security Declaration.

I/We, accept that I/we may be disqualified from bidding for any contract with you for a period of one year from the date of notification if I am/We are in a breach of any obligation under the bid conditions, because I/We

- a) Have withdrawn/modified/amended, impairs or derogates from the tender, my/our Bid during the period of bid validity specified in the form of Bid; or
- b) having been notified of the acceptance of our Bid by the purchaser during the period of bid validity (i) fail or reuse to execute the contract, if required, or (ii) fail or refuse to furnish the Performance Security, in accordance with the Instruction to Bidders.

I/We understand this Bid Securing Declaration shall cease to be valid if I am/We are not the successful Bidder, upon the earlier of (i) the receipt of your notification of the name of the successful Bidder; or (ii) thirty days after the expiration of the validity of my/ our Bid.

Signed: (insert signature of person whose name and capacity are shown)

In the capacity of (insert legal capacity of person signing the bid Securing Declaration)

Name: (insert complete name of person signing he Bid Securing Declaration)

Duly authorized to sign the bid for an on behalf of (insert complete name of Bidder)

Dated onday of (Insert date of signing)

Corporate seal (where applicable)



ANNEXURE - IV**DETAILS OF THE FIRM**

1.	Name of Firm	
2.	Registered / Postal Address	
3.	Working Office Address	
4.	Working Email id	
5.	Mobile No.	
6.	Telephone No.	
7.	Particulars of Registration with various government bodies/organization.	
8.	Were you ever debarred/ blacklisted by any department during the past seven years?	
9.	Name of Directors /Partners with Address	
10.	Permanent Account Number (PAN) No	
11.	GST Registration No.	



Format for Net Worth Certificate

It is to certify that as per the audited balance sheet and profit & loss account during the financial year, the net worth of ... (individual/farm/company) having registered address at as on 31.3.2025 is Rs.....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 years ending on 31.3.2025.

Signature of Chartered Accountant

.....

Name of Chartered Accountant

.....

Membership No. of ICAI



Date & Seal

4. Checklist for Documents to be uploaded on <https://eprocure.gov.in/eprocure/app>

Sl. No.	Documents	Reference
1.	Tender Documents	
2.	EMD	1.2.8
3.	Document support of Bonafide Business Entity	1.3.3
4.	GST Registration Certificate	1.3.3
5.	Permanent Account Number	1.3.3
6.	Average annual turnover of the bidder as per ITCC or profit and loss statement for last 5 year	1.3.6
7.	Experience Certificate	1.3.2
8.	OEM authorization certificate	1.2.7
9.	ANNEXUREs	
10.	SOQ	



4. SCOPE OF WORK

Indian Institute of Technology intends Supply, Installation, Testing & Commissioning of 2X21 TR air cooled inverter scroll type water chilling machine for revamping of ATDC-1 AC plant installed at E&ECE Department.

General

The ATDC-1 comprises Microelectronics and MEMS Lab situated at ground floor of E&ECE Department.

Existing plant:

The ATDC-1 is now air conditioned by 21TR central chilled water plant which is very old. The existing ac plant is consisting of:

- 2nos water cooled chilling unit (open type) with recip. compressor.
- 2nos chilled water pump.
- 2nos condenser water pump.
- 1no air handling unit
- 1no cooling tower(wooden)
- Existing ducting and piping network with ancillary items.

DESIGN CRITERIA

OUTDOOR DESIGN CONDITIONS:

Outdoor Design Conditions for Kharagpur are based on Weather data compiled and published by ISHRAE (WeDCo) for Kolkata and past experience corresponding to 2 % annual cumulative frequency of occurrence and the outdoor design conditions have been considered as follows:

Design Conditions	DRY BULB		Mean Coincident WBT		RH
	Deg F	Deg C	Deg F	Deg C	%
SUMMER	110	43.3	83	28	33
MONSOON	94.4	34.66	82	28	60
WINTER	56	13	48	9	55

INDOOR DESIGN CONDITIONS

SPACE	Temperature Deg C	Relative Humidity %	Remarks
Entire area	26±1.1	60±10 % at full load condition	

Note: Winter Heating is not envisaged.



PLANT SELECTION

Considering the above points & subsequent discussion with ATDC-1 authority, it is recommended that the existing system need to be replaced by new centralized chilled water system.

- The chilling units shall be replaced by 2x21 TR air cooled scroll chiller depending upon the space at Ground floor AC plant room.

The central plant module will have inverter scroll compressor which has built in continuously part load operation. Capacity can vary from 100% to 25% depending on the load which will make a substantial saving in power consumption due to usage, temperature variation in a day, months and the year.

- All pumps shall be replaced with primary pumping system by Horizontal split casing pumps with energy efficient motor.
- Chilled water piping shall be sized to meet the overall demands of the total installation.
- The MCC panel shall be outdoor type IP67 and shall be installed in Plant room. The incomer shall be provided by IIT Kharagpur and the termination and outgoing power from panel to respective equipments is in the scope of successful bidder.
- The civil foundation of the equipments like chiller, pumps, expansion tank & panel shall be done by the successful bidder in guidance of CCM section.

Additional scope need to be considered by AC vendor:

Assessment at site, design , fabrication and installation of support all complete including vibration isolation for component of HVAC system (Chiller, plumps, Exp. Tank, Electrical Panel etc) The drawings shall be duly vetted and the execution shall be carried out at site after approval of IIT Kgp. All above work shall be executed and finished good to the satisfactory of Engineer in charge.

EQUIPMENT DATA & TEST READINGS**A: AIR- COOLED CHILLING UNIT**

Make of chiller:

Quantity

Capacity of chiller at Ambient of 105 degF

Nominal capacity of Chiller

Type of compressor

Type of drive

Type of starter

Maximum Full load current at time of starting

Voltage/Frequency

Type of motor/KW

Power rating characteristics at part loads

Condenser Air Flow

Condenser inlet/outlet Temp at stated capacity

Chiller flow



Chiller Inlet/outlet temp at stated capacity
 Chiller fouling factor
 Chiller package footprint size
 Chiller package operating weight(kg)
 Noise (dB(A) at 1.5m distance.)

B: CHILLED WATER PUMPSETS (PRIMARY DUTY)

Make of Pumps
 Make of motor
 Quantity
 Mounting details
 Type of pump
 Impeller constructional details
 Casing
 Shaft seal assembly
 Pump RPM
 Type of coupling

Type of motor
 Voltage/frequency
 Motor KW
 Class of Insulation
 Motor RPM
 Type of starter

Pump capacity
 Pump Head
 Pump BKW
 Impeller Dia
 NPSH

Footprint of package
 Maximum operating weight



Technical specification of Chiller unit

1.1 Air cooled scroll chiller

Air cooled inverter type Scroll chiller. The unit should adopt advanced design which improves part load and full load efficiency and features higher redundancy.

1.2 Efficient components after optimal match

The unit should also have quality and efficient components configured in other parts. All the efficient components of the unit integrated with the optimized control system and form a perfect energy-saving complex.

1.2.1 High-efficiency plate/ shell & tube heat exchanger

The water side heat exchanger in operation mode adopts efficient plate heat exchanger with double-system, which is small in size and efficient in heat exchange.

1.2.2 Expansion valve

The unit shall have electronic/solenoid expansion valve.

Reliable & High quality

2.1 Quality prevails, trusted by users

OEM of chiller equipment shall have minimum 5 years of experience in supplying & successfully commissioning of such chillers.

2.2 Multiple safety protection, stability and reliability

Unit should have built- in safety protection functions of the unit can provide comprehensive protection for the unit and system.

Intelligent Control

3.1 User-friendly control function, convenient operation

The unit should use a user-friendly micro-computer controller with a LCD touch screen to facilitate operation. The controller should provide parameter display, parameter setting and mode switching functions. One controller can control up to 16 units and dynamically monitor the units' running statuses. Centralized control can be implemented as required.

3.1.1 Agenda management

Set the time of timed on/off every day in a period of week to make the unit operate automatically and implement the unsupervised function.

3.1.2 The compressor operates with balance

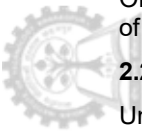
The controller monitors in real time the operating time of each modular unit in the group. The compressor is configured to operate intelligently and in balance as to prolong the service life of the unit.

3.1.3 Auto detection function

When a unit failure occurs, the controller can promptly and precisely displays where the failure locates and assists the fast troubleshooting, thus making the management and maintenance more convenient.

3.2 Full-automatic joint control function for more convenient use

3.2.1 Terminal interlocking control:



The operating state of the unit should be controlled according to the starting/stopping of terminal equipment so as to implement full-automatic operation.

3.2.2 Remote ON/OFF control:

Control the starting/stopping of the unit by connecting the remote switch.

3.3 Precise control of water temperature to improve comfort of air conditioners

By default, the unit should implement the control over outlet water temperature precisely. For cooling technology applications, water temperature is moderate and the cooling is highly stable. Slight changes in water temperature ensure stable and comfortable indoor air supply.

3.4 Low-noise design to make a tranquil night

In the case of low-load running, the fan rotate speed should reduce automatically and the speed of unit operation can be as low. The noise of the unit is substantially reduced and shall be restricted within 65dB(A) at 1.5m distance.

Stepless variable-speed fan adopted by the innovative unit can dynamically adjust the rotate speed according to unit operation. The noise level of the unit is significantly reduced using professional noise reduction practices, such as strictly choosing and improving fans, motors, structures and pipelines based on national precision noise rooms and noise spectrum analysis results.

3.4 Configurable MODBUS gateway to access BA system

The unit should apply, MODBUS gateway to easily connect the unit to Building Automation System (BAS) to implement centralized control and intelligent management. Unnecessary energy waste is avoided and the cost for operating air conditioners is reduced.

4.0 Mode of measurement

The chilling package unit complete with starter panel, spring isolators, installation, refrigerant and oil, commissioning and testing shall be regarded as one unit for purpose of measurement and payment.

CHILLED WATER SYSTEM

1.0 Scope

1.1 The scope of work covers supply, installation, testing and commissioning of the chilled water system comprising of:

- I) Circulating pump sets
- II) Piping and Insulation

1.2 All manufacturing and performance data shall be submitted and got approved prior to procurement.

1.0 Chilled Water pump sets

1.1 Chilled water pumps shall be centrifugal mono block/single stage split casing back inlet pump set. For details on the pump refer to the equipment data sheet. The pump shall have cast iron casing with bronze impeller trim driven by squirrel cage induction motor. The pumps shall have mechanical shaft seal assembly with heavy duty roller/ball bearings supporting the rotor.

1.2 The pump and motor shall be assembled at the manufacturer's plant on a single heavy duty base frame/plate suitable for installation on a concrete foundation. Each pump shall have a coupling guard, air vent/purge cocks,



flexible at suction and discharge connections, pump gland leakage holding cup which is to be piped to the nearest drain point.

PIPING

4.1 SCOPE

The scope of this section comprises the supply and laying of pipes, pipe fittings and valves, testing and balancing of all water and refrigerant piping required for the complete installation as shown on the Drawings. All piping inclusive of fittings and valves shall follow the applicable Indian Standards. All welders used for piping erection shall be well qualified (certificate should be submitted to Project Manager for approval) and shall have minimum 8 to 10 years' experience.

PIPE SIZES

Pipe sizes shall be as required for the individual fluid flows. Various pipe sizes have been indicated on the Drawings, these are for Contractor's guidance only and shall not relieve contractor of responsibility for providing smooth noiseless balanced circulation of fluids.

4.3 CHILLED, HOT AND CONDENSING WATER PIPING

Following material shall be used for pipes and fittings.

Pipes Nominal size (mm)	Material Specification
<150	IS 1239 Part-1
200 and above	IS 3589 Gr. FE 410 (8mm thick)
Fittings Nominal size (mm)	Material Specification
<40	Socket welded, ASTM A105 construction as per ANSI B16.11
50-150	Butt welded, ASTM A234 Gr. WPB as per ANSI B16.11
>200	Site fabricated from IS 3589 Gr. FE 410 (8mm thick)
Flanges Nominal size (mm)	Material Specification
< 150	IS 2062 Gr.A construction as per ANSI B16.5
≥ 200	IS 2062 Gr.A, construction as per ANSI B16.5

a. All jointing in the pipe system shall generally be by welding, unless otherwise mentioned, or directed at site. All welding shall be done by qualified welders and shall strictly conform to BIS Code of practice for manual metal arc, welding of Mild Steel. Out of three weld one butt weld of each welder shall be fully radio graphed for testing purposes. Upon approval of welding joints the concerned welder shall be allowed to carry further welding of pipes. Rest of the welds shall have 100% visual inspection.

b. All welded joints (except pipe welded end-to-end) shall be made by use of one-piece welding flanges, caps, nozzles, elbows, branch outlets and tees of approved make. Cut samples shall be submitted for approval, if directed. All such fittings etc., shall be of a type which maintain full wall-thickness at all points, simple radius and fillets, and proper bevels or shoulders at ends. All job welding shall be done by the electric arc welding process in accordance with the following:



All joints shall have 45 degree bevel type, pipe mill-bevelled or machine beveled by the contractor.

All scale and oxide shall be removed with hammer, chisel or file and bevel left smooth and clean.

Pipe lengths shall line up straight with abutting pipe ends concentric.

Both conductors from the welding machine shall be extended to locations at which welding work is being done. The leads from welding machine to location of welding work shall be held together with tape or other approved means so as to prevent induced current in structural steel, in piping or in other metals within the building. The ground lead shall be connected to length of pipe through joints in pipe, structural steel of building or steel pipe supports.

c. All pipes and their steel supports shall be thoroughly cleaned and given one primary coat of red oxide paint before being installed. For vibration isolators pre molded polyurethane pipe sections of 160 Kg/m³ density with adhesive shall be fixed between pipe and MS support. 10 mm thick MS 'U' clamp with resist flex shall be fixed on the pipe so that the pipe is kept in position. All welded piping shall be subject to the approval at site. All supports exposed to ambient shall be painted with two coats of epoxy. For condenser water piping running exposed to ambient, 2 coats of Epoxy paint shall be applied over piping. Then One coat of zinc chromate primer shall be applied. Finally colour painting shall be provided as per specification in identification of services.

d. Fittings shall be malleable casting of pressure rating suitable for the piping system. Fittings used on welded piping shall be of the weldable type. These shall form part of piping and are not separately identified in Schedule of Quantities.

e. Tee-off connections shall be through equal or reducing tees, otherwise ferrules welded to the main pipe shall be used. Drilling and tapping of the walls of them a in pipe shall not be resorted to.

f. Ball and butterfly valves conforming to the following specifications shall be provided as shown on Drawings :

Size	Construction	Ends Type
15 to 40 mm	Forged Brass	Screwed Ball
50 mm and over	Body Cast iron,	Wafer Butterfly

Type and requirements shall be as indicated in Schedule of Quantities. Valves shall have non-rising spindles unless specified otherwise and shall be suitable for PN 16 (unless specified otherwise in SOQ) rating. Butterfly valve should be of wafer type long neck construction single stem design with centre lugs to ensure proper alignment of pipe flanges. Mount valve onto flanges only after flanges have been welded to pipes using a tool piece and cooled down to room temperature to prevent damage to resilient seat. The rubber liner should be fully supported by the valve flanges. Appropriate dimensions and thickness of Flanges and Bolts, as per the Flange Tables ANSI B16.5 should be used. The flanges should be properly aligned with each other so that bolts are exactly perpendicular to the flanges. Evenly tighten the flange bolts to secure the valves. Counter flanges with nut-bolts and gaskets shall be provided by valve manufacturer.

g. Butterfly valves shall perform the function of isolating valves and shall be suitable for PN 16 (unless specified otherwise in SOQ) rating. Butterfly valves shall have Epoxy Coated cast iron body with Integrally moulded EPDM liner of replaceable type. The liner shall be integrally moulded on hard backup ring and shall be suitable for PN 16 (unless specified otherwise in SOQ) rating. All butterfly valves shall be provided with locking devices. Valves 250 mm and above dia shall be gear driven.





i. Balancing cum control valves shall be sized based on flow rates and pressure drops across cooling coil.

j. Manual double regulating balancing valves shall be provided at chiller, condenser, various tapp-offs and each AHU outlet line as indicated in Schedule of Quantities. These valves shall have built-in pressure-drop measuring facility to compute flow rate across the valve. The test cocks shall be long enough to protrude out of pipe insulation. To enable accurate and practical operation, measurement of flow and differential pressure shall be made with a computerized balancing instrument which shall enable the operator to read the flow directly without the use of diagrams or tables. In addition to measuring flow rate, differential pressure and temperature, computerized balancing instrument

shall have a computer programme to provide the following functions:

i. To balance the HVAC installation and calculate the necessary valve settings, based on system measurements.

ii. To store the results of balancing.

iii. To log measured values from a valve (differential pressure, flow rate or temperature).

iv. To printout saved data in computerised measurement protocol (CMP) consisting of :

- Name and size of Balancing Valve (BV)
- Presetting position of BV
- P at BV
- Flow at BV
- Design Flow

k. The supply of flanges shall form part of piping (not separately identified in Schedule of Quantities) and shall also include supply of bolts, washers, nuts and suitable asbestos fibre / rubber insertion gaskets (minimum 3 mm thick). Flanges shall be as per ANSI B16.5. l. All ball valves and ball valves with Y strainer shall be brass forged body construction with chrome plated brass ball and handle of stainless steel constructions. These are separately identified in Schedule of Quantities.

m. Non return valves shall be dual plate check valve provided as shown on the Drawings, and identified in Schedule of Quantities conforming to relevant Codes and in accordance with the following Specifications :

Size	Construction	Ends
40 to 300 mm	Body: Grey Cast iron (Epoxy Coated), CI IS 210 Gr. FG 260 Plates: CF-8 (SS-304), Hinge/Stop Pin: SS-410 Spring(s): SS-316. Seal: EPDM	Flanged

The bearing shall be PTFE material. Valves shall be PN 16 (unless specified otherwise in SOQ) rating.

n. Strainers shall be 'Y' type or Pot Strainer suitable for PN 16 (unless specified otherwise in SOQ) rating as shown on drawings and included in SOQ. 'Y' Strainer shall be fabricated out of MS 'C' class pipe two sizes higher than that of Strainer pipe size. Flanges as per ANSI B16.5 shall be provided at inlet and outlet connectors. The body shall be hot dip galvanized. Permanent magnet shall be provided in the body of the Strainer to arrest MS particles. Filter element shall be of non magnetic 20 gage SS sheet with 3 mm perforation. Cartridge having five different type of filters made out of SS 304 with different mesh sizes shall be provided. These will be replaced so as to get good quality of water in system during

commissioning. Strainers shall be provided at inlet of each Air Handling Unit and Pump as shown in drawings and included in SOQ.

Pipe Line Installation:

Pipe supports shall be standard factory made galvanised systems or fabricated from steel structural galvanised after fabrication. Supports shall be spaced as follows:

Size	Horizontal	Vertical
Upto 15mm	1.25m	1.8m
20 to 25mm	2 m	2.5m
32 to 125mm	2.4 m	3.0m
150 & over	3 m	3.0m

Additional supports shall be provided at the bends, at heavy fittings like valves, near equipment and as directed by the Engineer-in-charge. Pipe hangers shall be from galvanised structural steel, steel inserts in concrete, wall brackets or floor supports as decided by the Engineer-in-charge depending upon the location of the support. Hangers shall not be secured to light weight roof, wall, false ceiling or any other member which is not structurally meant for such loading. Hangers from structural steel shall be from suitably designed clamps or attachments and in no case should drilling or punching of such steel members be allowed. All pipe supports shall be capable of being adjusted in height to the tune of 50mm. All supports suspenders and hangers shall be galvanised after fabrication. Cut edges shall be painted with an approved zinc based paint.

Pipe clamps shall be specially fabricated fittings for pipes. All clamps shall be of galvanised mild steel. Clamps shall take into account pipe movement owing to temperature variations & anchors, and in no case shall the clamping arrangement induce stresses beyond the safe load limits of the pipe under fully filled conditions. Where pipes are insulated, the clamping shall interpose a hard insulation material or shall be designed so that the insulation is not compressed for more than 60% of its compression strength.

Vertical pipe risers shall be supported appropriately.

All pipe joints shall be welded except where flange joints are specified. Pipes upto 40mm NB shall use socket weld fittings with fillet welding and larger sizes use butt-welding type single V 35 deg weld preparation. Flange joints shall be provided at the following positions:

- Pair of flanges for isolation of equipment
- Mating flanges for equipment flange connections
- Mating flanges for valves, strainers as the case may be
- Pair of flanges at every 15m continuous run of piping

Where valves, strainers, NR valves adjoin, there is no need for additional mating flanges and valve flanges may be used to mate the other valves, strainers etc.





Entire piping shall be self draining, using only eccentric reducers at all change of sections, 25mm NB drain points with a dirt leg and a shut off valve shall be provided at all low points of the piping and the piping system shall be pitched 1% towards such low points. All air handling units drains shall be pitched 2% with a 75mm water seal trap. Fan coil unit drains also shall be pitched likewise but the water seal could be 40mm.

Testing

All hydraulic testing of piping shall be carried out before equipment connections are made. No insulation shall be carried out unless and until the piping, in section, is tested and tests approved. Piping may be tested in sections, with the approval of the Engineer and in such case all open ends shall be blanked off with necessary flanges.

All piping shall be tested for pressure equivalent to whichever is higher of the following:

2.5 times the no delivery head of the pump

1.5 times the maximum working pressures

In such a pressure test, the system shall hold for a minimum period of 3 hours. All pipe testing shall be witnessed and certified by the Engineer-in-charge and leaks or defects found in the joints shall be rectified.

The contractor shall make all arrangements for testing & removal after testing of all water connections, if any, without causing any damage to the property of the employer or any other contractor.

After the entire piping has been tested and equipment connected, the system of water piping shall be filled and drained till all the dirt, mill scale, welding debris and any other foreign matter is flushed out to the satisfaction of the Engineer-in-Charge. All strainers shall be cleaned of all accumulated dirt before the system is charged.

Entire piping system after equipment connection shall be flushed and chemically cleaned thoroughly to remove pipe scales, rust, oil and other loosely held particles on pipe surface. Immediately after cleaning and flushing the system shall be filled with clean water and chemically dosed to arrest further rusting and corrosion. Entire cleaning and refilling shall be carried out to the satisfaction of the engineer-in-charge.

Mode of measurement

All pipes shall be in unit length rounded off to the nearest centimeter and measured along the centre line of the pipe and all fittings, flanges etc. excluding the flange-to-flange distance of valves, strainers or any other equipment. The rate shall include all clamps, bolts etc. cutting holes in ceiling, floor or wall and making good the same including scaffolding staging supports, flexible etc. and painting of piping as per the painting specifications.

All valves, strainers etc. shall be measured per unit in each size and paid for.

All pressure gauges complete with socket, gauge cock and pressure gauge and CP brass capillary shall be measured per unit.

Thermometers together with thermo well, conducting fluid etc. shall be measured as one unit.

Air vents and drains shall each be measured per unit and paid for.

8. ELECTRICALS

8.1 Scope.

The scope of this section covers supply, installation & Testing of cables connecting equipments as per specification.

8.2 Electrical.

- The supply should be complete with appropriate earthing as per IE Rules.
- Depending on the number and capacity of units to be installed, each unit should have separate control through a main incoming switch with adequate capacity of approved makes.
- Each ODU should have separate SFU adjacent to the unit / within the unit and visible from the unit.
- Electrical cabling should be done with **armoured copper cable** of approved makes only.
- Fuse switches should be HRC cartridge type with visible indication.
- The cabling shall be done as per drawings or instruction from Engineer – in –charge.
- The cabling supporting shall be done as per drawing

LIST OF PREFERRED MAKES

SI No	Item	Preferred makes
1.	Chilling unit	JCI (York) / Carrier/LG/Trane/ Daikin/ Dunham Bush/ Mitsubishi (Climaveneta)/ Voltas/ Blue Star
2.	Pumps	M&Patt/ Kirloskar/ KSB/Grundfoss/ Armstrong
3.	Control Cables	Finolex/ Polycab/ Havells /KEI.
4.	Power Cables	Finolex/ Polycab/ Havells /KEI.
5.	Pipe	Tata/ Jindal/ Sail
6.	Pipe insulation	Armacell/ Kflex/ Kcell
7.	Valves & Strainers	Advance/ Audco/ L &T/ Rapid cool/ Zoloto/ Sant/ Honeywell
8.	HDPE tank	Supreme/ Ashirbad/ sintex
9.	Conduit	Precesion/AKG/POLYCAB
10.	Cable tray	Legrand/OBO/MK-Honeywell/Profab/Asian
11.	Electrical Panel	EAP/ Thitanix/ Calcultta power (CPRI approved panel manufacturer with switchgear of make: Siemens/ ABB/L&T/ C&S/ Legrand/ Hager)
13.	AHU	Edgetech/ Zeco/ VTS/ Flakwood

Note: For items not covered in the above list or in case of non-availability of preferred make of any item listed above, the make / brand to be used in the work, should have prior approval from the Engineer-In-Charge.



ANNEXURE-VI

PRICE-BID

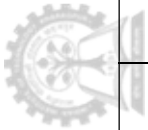
Price offer for "Supply, Installation, Testing & Commissioning of 2X21TR Air Cooled Inverter Scroll Type water chilling AC at ATDC-1, E&EC Dept. of IIT Kharagpur." as per aforesaid Tender Document including appendix – A AND ANNEXURE –I, II, III & V.

SR. NO.	DESCRIPTION	Qty	UNIT	UNIT RATE	TOTAL AMOUNT
				Rupees	Rupees
1	<p>Supply, installation, testing & commissioning of Eurovent / AHRI certified Air-cooled Inverter Scroll Chillers Unit. Each Chillers should be complete with fully Inverter type Scroll compressors, High efficiency DX Shell & Tube Heat exchanger Evaporator, Air-cooled condenser with protective coating , Control panel etc. The Chillers shall be charged with R410a /R32a Refrigerant. Each Chiller / Chillers should have 2 compressor and 2 independent refrigerants circuit. The drive motor suitable for 380 - 415V +/-5%, 3 phase, 50 cycles/sec . The Chillers should be factory insulated as per manufacturers standard. The inverter type heat pump should not have starting current more than Full load current. Micro-processor based controls with colorful touch screen alpha-numeric display in english for all operating parameters such as chilled water inlet, chilled water outlet, operating pressures etc. Flange connection shall be part of the Chiller / Chillers should be able to unload up to 20 % of the total load. Condenser should have energy efficient Electronically Commutated condenser fans.</p> <p>It is recommended that Chillers supplier should be the manufacturer of compressors used in Chiller for ease of sevice till the life of equipments.</p> <p>Cooling capacity at designed conditions indicated below :</p> <p>Capacity : 21 TR [Cooling]</p> <p>Cooling Water Temperature [Inlet /Outlet] : 12/7 deg F</p> <p>Ambeint Air temperature : 35 deg C [Cooling]</p> <p>Ambeint Air temperature : 35 deg C [Cooling]</p> <p>COP of Chillers : 2.6 [Cooling] and IPLV of 5.1 W/W (Including compressor and Fan motor).</p> <p>Water Pressure drop across the Chiller should be less than 20 ft of aqua.</p> <p>Chillers should be equipped with electronic expansion valve for the precise control.</p> <p>The unit was designed with a compact structure and robust assembly. The condenser fan is completed with high-efficiency wing style axial fan and direct driven motor for low sound level.</p> <p>The unit compressor should have factory fitted sound insulation box and noise level should be less than 70 dBA at 1 mtr. Additionally the Chiller unit should have the silent mode / night mode feature to</p>	2	NOS		



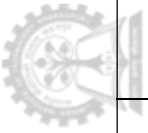


	<p>reduce the noise level below 65 dBA at 1 mtr. The Condenser should be of Aluminium Fin and copper tubes. Condenser fin should have factory applied heavy anti-corrosion treatment applied like Blygold or equivalent to industrial equipment in the ocean. This special coating should be able to protect the condenser fins from high salinity, humidity and pollution. Supplier should submit the valid test certificate for qualification of atleast 10000 Hours of salt spray test as per Test method B of ISO 21207 and ASTM B117 / ISO 9227 and same should be endorsed / verified by prestigious global agency like TUV.</p> <p>The Chiller / Chillers unit should have inbuilt feature for BMS communication with Modbus protocol using RS485 port.</p> <p>Supplier should submit the valid AHRI / Eurovent test certificate for the verification of capacity along with the Chillers model selection from the AHRI / Eurovent certified model selection program. 1working+1standby</p>				
2	<p>Supply, Installation, Testing and Commissioning of Horizontal split casing type Primary chilled water pump set, centrifugal type direct driven , motor suitable for VFD Drive, capable of delivering 55 GPM (approx) of water against a head of 20 Mtr. duly insulated with TF quality Expanded Polystyrene of not less than 50 mm thick & density not less than 20kg/cu.m duly cladded between 0.5 mm thick aluminium sheet properly clamped to pump in two semicircular sections, comprising of end-suction back pullout type pump with bronze impeller , Squirrel Cage Induction Motor (minimum energy saving label of IE-2 type) TEFC with Class 'F' insulation , 1440 rpm speed, SS410 Shaft, stainless steel shaft sleeve, suitable for operation on 415 ± 10% volts, 3 phase, 50 Hz A.C. supply, 150 mm dia dial type pressure gauges for inlet & outlet, mounted on common MS base plate, anti vibration pads, cement concrete foundation complete as per specifications etc. as required. The minimum pump efficiency is 70 % & motor rating should minimum 15 % higher than maximum BHP of the pump (1 Working + 1 Standby)</p>	2	NOS		



3	<p>Supply, Installation, Testing and commissioning of factory built floor mounted chilled water double skin type horizontal/vertical air handling units made of 25mm thick panels consisting of pre plasticized G.I. casing of thickness 0.8mm outside layer and 0.8 mm inside layer with polyurethane foam (PUF) insulation factory injected between them by injection moulding machine, complete with blower section with blower suitable for static pressure as required, minimum 2 bend GSS/PVC eliminators, cooling coil section with aluminium finned copper tubes (tubes thickness not less than 0.5mm) cooling coil of 6 row deep, filter section with 50mm thick metal viscous/ washable synthetic type air prefilters, belt drive package with TEFC drive motor of efficiency class IE5 suitable for 415 ± 10% volts, 50Hz, 3 Phase AC supply suitably designed for variable frequency drive applications, drain connections, stainless steel (18G) drain pan with PUF insulation, 150 mm dia. dial type pressure gauges (2 nos.) and industrial type thermometers (2 nos.) at the inlet and outlet of coil, auto purge valve wherever required, necessary vibration isolation arrangement etc. complete as per specification and of following capacities. Motor shall be flame proof.</p> <p>Capacity: 21.0 TR; Air Flow: 9200 CFM.</p>	1	NOS		
4	<p>Supplying, laying/ fixing, testing and commissioning of following nominal sizes of chilled water piping plumbing inside/outside the building (with necessary clamps, vibration isolators and fittings but excluding valves, strainers, gauges etc.) duly insulated with fire retardant quality expanded polystyrene moulded pipe section of density 24 Kg/cu.m after a thick coat of cold setting adhesive (CPRX compound) wrapping with 500g polythene faced hessain and finally applying 0.63mm aluminium sheet cladding complete with type3 , grade 1 roofing feltstrip(as per IS:1322 as amended up to date) at joints repairing of damage to building etc. as per specifications and as required complete in all respect. Note : The Pipes of sizes 150mm & below shall be M.S. 'C' class as per IS : 1239 and pipes size above 150mm shall be welded black steel pipe heavy class as per IS: 3589, from minimum 6.35mm thick M.S. Sheet for pipes upto 350 mm dia. and from minimum 7mm thick MS sheet for pipes of 400 mm dia and above.</p> <p>Size-65mm dia</p>	120	RMT		
5	<p>Supply, installation, testing and commissioning of PN16 rated 3 Way valve of following size. 65 mm dia</p>	1	NOS		
6	<p>Providing and fixing in position the water flow switch complete as required.</p>	2	NOS		

7	Supply, installation, testing & commissioning of Y - STRAINER of Ductile CI Body flanged ends with stainless steel strainer for hot / condenser water circulation including insulation as specified Size-65mm dia	2	NOS		
8	NON - RETURN VALVE with duel plate of C I body SS plates vulcanized NBR seal flanged end & PN 16 pressure rating for chilled / hot water circulation including insulation as specified. size-65mm dia	2	NOS		
9	BALANCING VALVE with CI body ,SS Plates vulcanized NBR Seal flanged end and PN 16 Pressure rating as specified size-65 mm dia	2	NOS		
10	Providing and fixing in position the industrial type pressure gauge with gunmetal/brass valves complete as required	12	NOS		
11	Providing and fixing in position the industrial type thermometer complete as required	8	NOS		
12	Supply, installation, balancing and commissioning of fabricated at site GSS sheet metal rectangular/round ducting complete with neoprene rubber gaskets, elbows, splitter dampers, vanes,hangers, supports etc. as per approved drawings and specifications of sheet thickness 0.63 mm	100	SQMT		
14	Supply, installation, balancing and commissioning of fabricated at site GSS sheet metal rectangular/round ducting complete with neoprene rubber gaskets, elbows, splitter dampers, vanes,hangers, supports etc. as per approved drawings and specifications of sheet thickness 0.80 mm	40	SQMT		
15	Supply & Installation of 19 mm thick , 20 Kg/cu.m density, class-O closed cell nitrile rubber insulation for ducts.	140	SQMT		
16	Supply & Installation of 25 mm thick , 32 Kg/cu.m density, Resin bonded glass wool for ducts.	25	SQMT		
17	Supplying & fixing of powder coated extruded aluminium Supply Air Grills / Diffuser with aluminium / GI volume control dampers as per specifications.	4	SQMT		
18	Supplying & fixing of powder coated extruded aluminium Supply Air Grills / Diffuser without aluminium / GI volume control dampers as per specifications.	5	SQMT		
19	Supply & Installation of Canvas Connection.	2	NOS		





20	Supplying, installation, testing & commissioning of cubical type, extensible, bolted construction LT Panel suitable for 415 V, 3 Phase, 4 wire 50 Hz AC supply system of suitable size fabricated in compartmentalized design from CRCA sheet steel of 2 mm thick for frame work / load bearing members / doors and covers and 3 mm thick for gland plates including cleaning & finishing complete with 7 or more tank process for powder coating in approved shade, having following capacity extensible type TPN aluminium alloy bus bars of high conductivity with 100 % neutral, DMC / SMC bus bar supports, with short circuit withstand capacity of 31 MVA for 1 Second at 415 Volts, bottom base channel of MS section not less than 100 mm x 50 mm x 5 mm thick (ISMC 100); fabrication shall be done in transportable sections, entire panel shall have a common tinned copper earth bar of size 25 mm x 5 mm at the rear with 2 Nos. earth stud / terminals, solid connections from main bus bar to switch gears with required size of aluminium bus bars and control wiring with 2.5 Sq.mm FRLS /.HFFR grade PVC insulated copper conductor single core cable, cable alleys, cable gland plates in two or more halves, suitable type cable terminals for termination of cable of size up to 3 1/2 x 300 Sq. mm XLPE cable including providing following switch gears and accessories :1) 2 nos outgoing feeder for 2 nos AC Chiller of 35 KW capacity.2) 2 nos outgoing feeder with star delta starter for 2 nos AHU of 15 KW capacity.3) 2 nos outgoing feeder with dol starter for 2 nos Pump of 2.2 KW capacity.	1	JOB		
21	Supply & installation of XLPE insulated armoured Copper Power Cable for Chillers, Pumps & AHUs from main electrical panel of size 4C x 35 Sqmm	40	RMT		
22	Supply & installation of XLPE insulated armoured Copper Power Cable for Chillers, Pumps & AHUs from main electrical panel of size 4C x 10 Sqmm	20	RMT		
23	Supply & installation of XLPE insulated armoured Copper Power Cable for Chillers, Pumps & AHUs from main electrical panel of size 4C x 2.5 Sqmm	20	RMT		
24	Buy Back for old existing water cooled Package AC, pumps, cooling tower, pipes etc.	1	JOB		
TOTAL COST including GST					

Note: Item no.24 shall be considered negative value.