

**TENDER BIDDING DOCUMENT  
FOR  
132KV LINE RING  
SYNCHRONIZING PROJECT  
PHASE-I IN MIZORAM**



**Power & Electricity Department,  
Government of Mizoram**

## Contents

### SECTION - I INSTRUCTION TO TENDERERS

1	General	4
2	Mode of Tendering	4
3	Qualifying Requirements	4
4	Documents to be Submitted with Technical Bid	5
5	Earnest Money deposit	6
6	Bid Validity	6
7	Site Visit and Local Conditions	6
8	Technical Submission Requirements	7
9	Standard and Certifications	7
10	Pre-Bid Meeting	7
11	General Bid Instructions	7
12	Variation/ Addition/Omission	8
13	Ceiling/ Price Restriction	8

### SECTION - II SCOPE OF WORK

1	General	9
2	Broad Scope of the Project	9
3	Detailed Scope of Responsibility	10
4	Specific Work Components	11
5	Existing System Protection and Damage Rectification	12
6	Incidental Works	12
7	BOQ and Detailed Survey	12
8	Locations	12
9	Completion Criteria	13

### SECTION - III GENERAL CONDITIONS OF CONTRACT

1	Definition of Terms	14
2	Manner of Execution	16
3	Price	16
4	Terms of Payment	16
5	Mode of Payment	18
6	Target Date of Completion	18
7	Extension of Time	18
8	Defect Liability Period	18
9	Completion of the work	19
10	Taking over	20
11	Insurance of Equipment	20
12	Replacement	20
13	Rejection	20
14	Inspection & Testing During Manufacture	20
15	Guarantee	21
16	Force Majeure	21
17	Payment due from the Contractor	22
18	Performance Bond or Bank Guarantee for Security	22
19	Delay in Completion	22

20	Tenderer's Default & Liability	22
21	Termination of the Contract	23
22	Powers of the Engineer upon Termination	24
23	Bankruptcy	24
24	Contingent Fees	25
25	Non-Assignment	25
26	Certificate not to Affect Rights of the Purchaser of the Contractor	25
27	Settlement of disputes	25
28	Arbitration	25
29	Jurisdiction	26
30	Language and Measure	26
31	Correspondence	26
32	Consignee and Paying Authority	26
33	Legal Addresses of the Parties	27
34	Additional Project Specific Provisions	27
<b>SECTION – IV SPECIAL CONDITIONS OF CONTRACT</b>		
1	Interface Responsibility	28
2	End-to-End System Performance	28
3	Shutdown Co-ordination	28
4	OPGW & Protection Integration	28
5	SCADA Compatibility	28
6	Synchronizing System Responsibility	28
7	Detailed Engineering Submission	28
8	Completion Criteria(Project Specific)	28
9	Data & Document Compatibility	29
10	No Extra Claim	29
11	Type Test Report	29
12	GTP	29
<b>SECTION - V TECHNICAL SPECIFICATION</b>		
1	HTLS Panther Conductor	30
2	OPGW System	38
3	OPGW Terminal Equipment and Communication System	44
4	Line Differential Protection System	50
5	Synchronization and SCADA Visibility	55
6	Carrier Aided Protection System(DTPC)	60
7	48V Battery Bank and Battery Charger	64
8	Current Transformer	69
9	Miscellaneous Tools	73
<b>SECTION – VI REFERENCE BOQ AND EPC PRICE SCHEDULE</b>		
1	Reference BOQ / Scope Quantity Schedule	75
2	EPC Bid Price Schedule	79
<b>SECTION - VII FORMS</b>		
1	Prescribed Forms to be submitted along with supporting documents-Form 1-8	80
2	Form 6- Integrity Declaration	81
3	Form-7-Site Survey Certificate	82
4	Form-8-Form of Earnest Money	83

5	Form-9-Form of Performance Security	85
6	Form 10-Bank Guarantee for Mobilization Advance	88
7	Form 11-Standard Form of Agreement	90

## TABLE

<b>RFB Notice/ NIT No.</b>	
<b>Contract Title for the Procurement</b>	<b>132kV Line Synchronizing Project-Phase I in Mizoram</b>
<b>Mode of Procurement/Bidding</b>	Single Stage Two-Envelope Bidding Process with e-Procurement/ e-Tendering
<b>Date of Release of RFB Notice/ NIT</b>	03.06.2026
<b>Date &amp; Time of Pre-Bid Meeting</b>	Dt.17.06.2026 at 1400 hrs.
<b>Last date of Bid Submission</b>	Dt.24.06.2026 at 1000 hrs.
<b>Date of Opening of Technical Part (First Envelope) of the bid</b>	Dt.24.06.2026 at 1600 hrs.
<b>Opening of Financial Part (Second Envelope) of the Bid</b>	To be notified later. Financial Part of bids from only those bidders shall be opened who, upon evaluation of Technical Part of the bids, are found eligible and qualified, and whose bids are found responsive to bidding documents.
<b>Location of Submission/ Opening of Bids, as applicable</b>	Engineer-In-Chief Office, P&E Dept. Kawlpheha, MINECCO, Aizawl, Mizoram Pin: 796001
<b>Estimated Project Cost</b>	Total Project Cost: Rs.13,82,72,589.(Rupee Thirteen Crore Eighty Two Lakh Seventy Two Thousand Five Hundred Eighty Nine Only)
<b>Tender processing Fees</b>	Rs.2500(Two thousand five hundred) should be paid in shape of Demand Draft in favour of "Engineer-In-Chief Office, P&E Dept. payable at Aizawl, Mizoram.
<b>EMD/ Bid Security</b>	The amount of the Bid Security shall be ₹23,82,726/- (Rupees Twenty-Three Lakh Eighty-Two Thousand Seven Hundred Twenty-Six only). This is as per CPWD guideline, clause no. 5.1.2, Subclause 2 mentioned below: (1) For works estimated to cost up to Rs Ten Crores or as notified from time to time: 2% (Two percent) of the estimated cost.(2) For works estimated to cost more than Rs. Ten Crores or as notified from time to time : Rs.Twenty Lakhs plus 1% (one percent) of the estimated cost put to tender in excess of Rs. Ten Crores).
<b>Performance Security</b>	The Performance Security amount is 10% of Project Cost.
<b>Bid Validity period</b>	The bid validity period will be 180 days from date of Opening of Technical Part of the Bid.
<b>Time for Completion</b>	9 Months from the Effective Date of the Contract
<b>Address for Correspondence</b>	Office of The Engineer in Chief, Power & Electricity Department, KAWLPHETHA, MINECCO, Khatla, Mizoram, Pin-796001 Email: eincpower@gmail.com Contact no: 7832871956.

## **SECTION – I**

### **INSTRUCTIONS TO TENDERERS**

#### **1. General**

These Instructions to Tenderers shall be read in conjunction with the Notice Inviting Tender, Scope of Work, Technical Specifications, Bill of Quantities, General Conditions of Contract and all other sections of the Tender Document.

The tender is invited for the work of design, engineering, supply, installation, testing and commissioning of the 132kV Lines Ring Synchronizing Project – Phase I in Mizoram on EPC / Turnkey basis.

The bidder shall be deemed to have examined all the tender documents and to have fully satisfied himself regarding the nature and extent of the work, the general and local conditions, access to the site, route conditions, availability of labour, materials, transport, shutdown requirements, statutory obligations and all other matters affecting the execution of the work. No claim whatsoever shall be entertained on account of failure to examine the tender documents or to inspect the site and acquaint himself with all relevant conditions.

#### **2. Mode of Tendering**

The tender shall be invited and processed under a two-bid system, namely Part-I consisting of the Technical / Qualification Bid and Part-II consisting of the Financial Bid.

Part-I shall contain all documents relating to eligibility criteria, technical qualification, experience, financial capability, statutory registrations, technical compliance, GTPs, datasheets, OEM authorizations and all other documents required under the tender. Part-II shall contain only the duly filled financial bid, price schedule or BOQ.

The Financial Bid of only those bidders who are found technically and commercially responsive in Part-I shall be opened.

#### **3. Qualifying Requirements**

The qualification of a bidder shall be based on meeting the minimum criteria specified below.

Sl. No.	Criteria	Requirement
1	Experience	The bidder shall have successfully completed, during the last seven years ending on the last date of bid submission, similar works of aggregate value not less than ₹553

		<p>Lakh(40% of the estimated cost put to tender)</p> <p>Similar work shall mean completed works covering: Construction/augmentation/upgradation/renovation of 33 kV or higher voltage substation-related works, including associated bay equipment, protection, communication, SCADA/OPGW or related communication system works, wherever applicable.</p>
2	Financial Turnover	The bidder shall have achieved an average annual financial turnover of not less than ₹415 lakh(30% of the estimated cost) during the last three consecutive financial years, supported by audited financial statements and certificate from Chartered Accountant.
3	Profitability	The bidder shall not have incurred losses in more than two years during the last available consecutive audited financial years.
4	Banker's Certificate / Net Worth	The bidder shall submit either a Banker's Certificate of not less than ₹553 lakh(40% of the estimated cost) or a Net Worth Certificate of minimum ₹138 lakh(10% of the estimated cost) certified by a Chartered Accountant with UDIN.
5	Statutory Registration	The bidder shall possess and submit valid PAN, valid GST Registration and valid Electrical Contractor License authorizing execution of the relevant works of 132kV level.
6	Joint Venture / Consortium	Joint Venture / Consortium shall be permitted up to three partners. The Lead Member shall bear primary responsibility, all partners shall be jointly and severally liable, and the JV Agreement shall clearly indicate the scope and responsibilities of each partner.

P&E Department reserves the right to waive minor deviations if they do not materially affect the capability of the Bidder to perform the contract

#### **4. Documents to be Submitted with Technical Bid**

The bidder shall upload or submit the following documents along with Part-I of the bid:

1. Work Orders, Experience Certificates and Completion Certificates for similar works.
2. Certificate of Financial Turnover for the last 3 years from Chartered Accountant and audited financial statements.
3. Profitability Certificate.
4. Banker's Certificate or Net Worth Certificate.
5. Valid Electrical Contractor License authorized to undertake works at 132kV level, GST Registration Certificate and PAN.
6. Proof of Earnest Money Deposit.
7. Legally Valid Joint Venture Agreement and Power of Attorney signed by all participating parties, wherever applicable.
8. List of key manpower with qualifications and designations.
9. Integrity Declaration(Form 6).
- 10.Site Survey Certificate for each sub stations and lines certified by field SDO/EE (Form 7).
- 11.OEM Authorizations for major equipment, wherever applicable.
- 12.Technical compliance statement and preliminary GTP or datasheets for major equipment.
- 13.Any other document required under the tender.

**Note:** *The bidder shall submit duly filled applicable Forms 1 to 7 of Section VII along with supporting documents. Incomplete submission of the above documents will be liable for rejection.*

### **5. Earnest Money Deposit(EMD)**

The bidder shall furnish Earnest Money Deposit of ₹23,82,726/- (Rupees Twenty-Three Lakh Eighty-Two Thousand Seven Hundred Twenty-Six only) in the form of Demand Draft/Fixed Deposit Receipt, Banker's Cheque, Bank Guarantee, Insurance Surety Bond pledged in favour of the Engineer-in-Chief, Power & Electricity Department, Government of Mizoram.

Relaxation or exemption, if any, shall be allowed only in accordance with applicable Government rules and upon submission of valid documentary proof. Any bid not accompanied by valid EMD, unless exempted under applicable rules, shall be liable for rejection.

### **6. Bid Validity**

The bid shall remain valid for a period of 180 (one hundred eighty) days from the date of opening of the Technical Bid. Any bid with a shorter validity period shall be liable for rejection.

### **7. Site Visit and Local Conditions**

The bidder is mandated to visit and inspect the site and route conditions before submission of bid. The bidder shall be deemed to have fully acquainted himself with local conditions, access roads, terrain conditions, line route constraints, shutdown requirements, storage and transportation arrangements, right of way issues, climatic conditions and labour and logistics availability.

## **8. Technical Submission Requirements**

The bidder shall submit, along with the Technical Bid, the technical compliance statement, filled preliminary GTP, product datasheets or catalogues, manufacturer's authorization wherever required, and type test references or test certificates for all major items.

Major items shall include, but not be limited to, the HTLS Conductor (ACSS 30/7/290), Current Transformers, 48 Fibre DWSM OPGW, Line Differential Relay, DTPC / Teleprotection System, SCADA Visibility Devices and Battery Charger and Battery Bank.

Submission of filled technical compliance and preliminary GTP for major equipment shall be mandatory. The successful bidder shall submit final detailed GTPs, drawings, datasheets, QA plans and supporting documents after award and before manufacture or supply for approval by the Department.

## **9. Standards and Certifications**

All materials and equipment offered shall conform to relevant applicable standards such as IS, IEC, IEEE, ITU-T, CEA, CBIP, REC and utility standards, as applicable. The bidder shall submit valid manufacturer's technical documents, quality certifications, test certificates and compliance documents relevant to the offered items.

## **10. Pre-Bid Meeting**

A pre-bid meeting may be held on the date, time and venue indicated in the tender portal. The purpose of the meeting shall be to clarify issues and answer questions raised by prospective bidders. Non-attendance at the pre-bid meeting shall not be a ground for disqualification.

## **11. General Bid Instructions**

1. Only one bid shall be submitted by each bidder, either individually or as part of one Joint Venture or Consortium.
2. An incomplete and/or ambiguous and/or conditional bid and/or bid submitted late is liable to be ignored/ summarily rejected.
3. A single work order or contract shall be issued for the entire project.
4. The Contractor shall be responsible for obtaining all statutory and safety clearances required for execution of the work.



5. The Contractor shall coordinate with SLDC, field officers and other concerned authorities for shutdowns and execution planning.
6. The materials used shall be of approved quality and from reputed manufacturers.
7. The Department reserves the right to accept or reject any or all bids without assigning any reason, subject to applicable rules.

#### **12. Variation / Addition / Omission**

The Contractor shall not make any modification in the works, materials or equipment except with prior written approval of the Employer or Engineer-in-Charge. The Employer shall have the right to alter, amend, omit or otherwise vary the scope of work for successful implementation and commissioning of the project.

## **SECTION – II**

### **SCOPE OF WORK**

---

## 1. General

The scope of work under this contract shall include the design, detailed engineering, supply, transportation, unloading, storage, handling, erection, installation, testing, commissioning, integration, documentation and handing over of all materials, equipment and systems required for successful completion of the project.

The project shall be executed on EPC / Turnkey basis, and the Contractor shall have single-point responsibility for the complete and successful execution and commissioning of the project.

The scope of work shall include all items specifically listed in the BOQ / Technical Specifications and all incidental works necessary for successful operation and commissioning, whether specifically mentioned or not. No separate payment shall be admissible for incidental works, accessories, fittings, consumables, minor hardware, integration items or miscellaneous items necessary for successful completion and commissioning unless specifically provided elsewhere in the contract.

## 2. Broad Scope of the Project

The project is a multi-location EPC package covering identified line sections, associated bay interfaces and substation works at Luangmual, Melriat, Khawiva, Kawmzawl, Thenzawl, Bukpui, Zuangtui New, Zuangtui Old and Sihhmui, including reconductoring, OPGW-based communication, terminal equipment, line differential protection, DTPC, synchronization facilities, SCADA visibility works, battery charger and battery bank systems, and all related integration works as indicated in the BOQ.

<b>Sl. No.</b>	<b>Item</b>	<b>Quantity</b>
1	Reconductoring of 132kV line with HTLS Conductor (ACSS 30/7/290 type) in place of existing ACSR Panther Conductor on Zuangtui – Luangmual section.	As per BOQ
2	Providing and Erection of 132kV Current Transformers.	As per BOQ
3	Replacement of Ground Wire with 48 Fibre DWSM OPGW on identified line sections.	As per BOQ
4	Supply, Installation, Testing and Commissioning of Line Differential Relays.	As per BOQ
5	Supply, Installation, Testing and Commissioning of Synchronizing Devices.	As per BOQ
6	Supply, Installation, Testing and Commissioning of OPGW End	As per BOQ

	Devices, including FODB, ADSS and Patch Cords.	
7	Supply, Installation, Testing and Commissioning of DTPC (Digital Teleprotection Coupler).	As per BOQ
8	Supply, Installation, Testing and Commissioning of SCADA Visibility Devices.	As per BOQ
9	Supply, Installation, Testing and Commissioning of 48V Battery Charger and 48V Battery Bank.	As per BOQ
10	Supply of Tools and Plants including Fiber Splicing Machine, OTDR, Conductor Cutters and related items.	As per BOQ

### **3. Detailed Scope of Responsibility**

The Contractor's scope shall include, but not be limited to, all necessary survey, route verification, technical verification, engineering calculations, compatibility checks and preparation of drawings and data sheets. The Contractor shall submit all relevant drawings, technical data, manuals and supporting documents required for approval.

The Contractor shall supply all materials and equipment required for complete execution of the work, including all accessories, fittings, clamps, connectors, cables, mounting arrangements, fasteners, supports and miscellaneous items required for successful completion of the project.

The Contractor shall be responsible for packing, forwarding, transportation, loading and unloading, storage at site, preservation, conservation and insurance of all materials and equipment up to successful handing over of the project.

The Contractor shall carry out all erection, installation and integration works required for the project, including all associated line works, substation works, communication works, protection works, synchronizing works and DC supply system works.

The Contractor shall carry out all necessary routine checks, pre-commissioning checks, electrical tests, optical tests, relay tests, communication tests, SCADA verification, synchronizing checks, functional tests and end-to-end tests required for successful commissioning of the project.

The Contractor shall submit GTPs, drawings, data sheets, operation manuals, maintenance manuals, test reports, commissioning reports and as-built drawings, and shall provide training to departmental personnel wherever required.

### **4. Specific Work Components**

#### **4.1 HTLS Reconductoring**

The Contractor shall dismantle the existing ACSR Panther conductor and reconductor the identified 132kV line section with HTLS Conductor of ACSS 30/7/290 type, complete with all accessories, fittings, joints, clamps, jumpers, dampers and related hardware. The Contractor shall be responsible for sag-tension calculations, stringing methodology, statutory clearances, protection of existing structures and equipment and successful commissioning of the reconducted line section. This shall also include shifting of the dismantled conductor to a specified place/store as directed by the Engineer in Charge.

#### **4.2 OPGW Installation**

The Contractor shall dismantle the existing ground wire, wherever applicable, and replace the same with 48 Fibre DWSM OPGW complete with all accessories and fittings on the identified line sections. The Contractor shall also provide all required suspension and tension fittings, vibration dampers, downlead clamps, earthing kits, joint boxes and optical accessories.

#### **4.3 OPGW End Devices**

The Contractor shall supply and install all required OPGW end devices including FODB, ADSS cable, patch cords, optical terminations and related communication accessories.

#### **4.4 Line Differential Relays**

The Contractor shall supply, install, configure, test and commission Line Differential Relays at the identified substations or locations and ensure successful operation with the communication and teleprotection system.

#### **4.5 DTPC / Teleprotection System**

The Contractor shall supply, install, integrate, test and commission the Digital Teleprotection Coupler system complete with all required interfaces, accessories and communication arrangements.

#### **4.6 Synchronizing Devices**

The Contractor shall supply, install, test and commission synchronizing devices and associated control and indication accessories as required for safe and reliable synchronization of the system.

#### **4.7 SCADA Visibility Devices**

The Contractor shall supply, install, integrate, test and commission all devices required for SCADA visibility and remote monitoring of the identified substations and line sections.

#### **4.8 Battery Charger and Battery Bank**

The Contractor shall supply, install, test and commission 48V Battery Chargers and 48V Battery Banks complete with all supports, wiring, accessories and interconnections.

#### **4.9 Tools and Plants**

The Contractor shall supply all specified tools and plants included in the sanctioned scope or BOQ.

### **5. Existing System Protection and Damage Rectification**

If any existing line, substation equipment, civil structure, communication system or other infrastructure is damaged or affected during execution of the work, the same shall be rectified, repaired or restored by the Contractor at his own cost to the satisfaction of the Engineer-in-Charge.

### **6. Incidental Works**

The scope of work shall include all incidental and auxiliary works necessary for successful completion, commissioning and handing over of the project, whether or not specifically mentioned in the tender documents.

This shall include, but not be limited to, dismantling, shifting, mounting, earthing, labeling, ferruling, terminations, control wiring, communication wiring, optical testing, shutdown coordination, site restoration, housekeeping and safety arrangements.

### **7. BOQ and Detailed Survey**

The BOQ and project scope are based on DPR, preliminary investigation, preliminary survey and sanctioned requirement. The quantities indicated are indicative/approximate and are intended only to define the broad scope of the project. The Contractor shall carry out detailed verification and detailed engineering before execution.

No additional payment shall be admissible for minor variations, fittings, accessories, incidental items or integration items necessary for complete and successful commissioning unless specifically approved in writing by the Employer as extra scope beyond the sanctioned project requirement.

### **8. Locations**

The work shall be executed at the following substations or locations and associated line sections, as applicable:

<b>Substation / Location</b>	<b>District</b>
Zuangtui New	Aizawl

Zuangtui Old	Aizawl
Luangmual	Aizawl
Melriat	Aizawl
Sihhmui	Aizawl
Khawiva	Lunglei
Kawmzawl	Lunglei
Thenzawl	Serchhip
Bukpui	Serchhip

The exact work fronts and execution locations shall be as per approved drawings, sanctioned scope and instructions of the Engineer-in-Charge.

### **9. Completion Criteria**

The work shall be deemed complete only after supply of all materials and equipment, erection or installation of all components, successful testing and commissioning, successful integration and performance demonstration, submission of all drawings, manuals and documents, rectification of defects or deficiencies and handing over to the Department.

## **SECTION – III**

### **GENERAL CONDITIONS OF CONTRACT**

#### **1. DEFINITION OF TERMS**

In the Contract, the following expressions shall, unless the context otherwise requires, have the meanings, hereby respectively assigned to them.

EPC- Engineering Procurement Construction

SCADA- Supervisory Control and Data Acquisition

DPR- Detail Project Report

The 'Contract' means the Documents duly signed by both the Parties, forming formal Agreement executed between Power & Electricity Department, Govt. of Mizoram, Aizawl and the Tenderer.

'Contract Price' shall mean the total sum of financial involvement named in or calculated in accordance with the provisions of the Contract Price.

'General Conditions' shall mean these General Conditions of Contract.

'Month' shall mean a Calendar Month.

'Owner' means the Power & Electricity Department, Govt. of Mizoram, Aizawl.

'Project' refers to that mentioned under the headings of the Tender Specifications.

'Purchaser' shall mean the Engineer-in-Chief, Power & Electricity Department, Govt. of Mizoram, Aizawl.

'Purchaser's Representatives' shall mean any Person or Consulting Firm appointed and remunerated by the Purchaser to Supervise, Inspect, Test and Examine Workmanship on the Survey, Supply and erection works.

'The Contractor' shall mean the Tenderer whose Bid has been accepted by the Purchaser and shall include the Tenderer's Executors, Administrators, Successors and permitted assigns approved by Engineer-in-Chief, Power & Electricity Department, Mizoram, Aizawl.

'The Engineer/Engineer in charge' shall mean the Engineer appointed by the Purchaser/Owner for the purpose of this Contract.

'Specification' shall mean the specification annexed to or issued with the General Conditions and shall include the Schedules and Drawings attached thereto as well as samples and patterns, if any.

'Ton' or 'Tonne' used in these specifications shall mean Metric Ton, unless otherwise specified.

'Plant' is any integral part of the works, which has mechanical, electrical, electronic or chemical or biological functions.

'Contract Documents' shall mean the following documents which shall be deemed to form an integral part of this Contract.

- i) Contract Agreement, Instructions to Tenderers and all conditions of contract.
- ii) Contractor's proposal including the letters or clarifications there to between the Contractor and the Purchaser prior to award of Contract and
- iii) Equipment Specifications and Drawings. In the event of any conflict between the above mentioned documents, the Contract Agreement shall prevail.

'Works' means the materials and equipment to be supplied and the work to be executed as defined and set out in the specifications and includes all extra Work, Additions, Deletions, Substitutions and Variations ordered by the Engineer in accordance with the provisions of the Contract.

'Site' means the land on, under, in or through which the works are to be executed or carried out or such lands as may be agreed between the Owner and the Tenderer as being reasonable and necessary for the carrying out of the work.

'Labourer' shall mean all categories of labour engaged by the Contractor, his Sub-Contractor and his piece workers for work in connection with the execution of the work covered by the specifications. All these labourers will be deemed to be employed primarily by the Contractor.

'Fiscal Year' shall mean a year beginning on 1st April and ending on 31st March in the succeeding year.

'Security Deposit' shall mean all deposits whether in Government Securities, Fixed Deposit Receipts or Bank Guarantees from Nationalized Banks of India, amounts deducted from interim payments or in any other form as specified by the Purchaser pledged to the Owner for due performance of the Contract and shall be adjusted in case of compensations or penalties and which may stand for future either in part or whole as the situation demands.

Letter of Intent means the letter from the Engineer-in-Chief conveying his intention to accept the Bid subject to reservations as may have been stated therein.

Letter of Award/Instruction to Commence means the letter from the Engineer-in-Chief notifying the formal acceptance of the Bid subject to the terms and conditions finally arrived at after conduction/negotiation (if any).

'Manufacturer' used herein refers to the party proposing to design, fabricate and manufacture as specified complete or in part.

'Authorised Representative' of the Owner shall mean any Authorized Officer of the Owner from the level of Junior Engineer and above.



## **2. Manner of Execution:**

The project shall be executed on EPC / turnkey basis with single-point responsibility.

## **3. Price:**

The Contract shall be on **single lump-sum EPC / turnkey basis** for complete design, detailed engineering, supply, transportation, insurance, unloading, storage, handling, erection, installation, integration, testing, commissioning, performance demonstration, documentation, training and handing over of the entire works covered under the Contract.

The quoted **Contract Price** shall be deemed to include the cost of all design, materials, equipment, accessories, fittings, consumables, minor hardware, tools, tackles, labour, transport, freight, transit insurance, loading, unloading, storage, preservation, watch and ward, taxes, duties, levies, labour cess(1% of Contract Price) as applicable, erection inputs, testing equipment, commissioning activities, integration works, documentation, as-built drawings, training and all incidental and auxiliary works necessary for complete and successful execution of the project in accordance with the Contract.

The Contract Price shall remain **firm and binding** during the currency of the Contract, except to the extent specifically provided elsewhere in the Contract for statutory variation, approved change in scope, or other expressly admissible adjustment.

Any price break-up, schedule-wise break-up, BOQ-wise break-up, or milestone-wise allocation furnished by the Contractor shall be for the purposes of bid analysis, reasonableness check, progress assessment and payment administration only, and shall not alter the nature of the Contract as a **lump-sum EPC Contract**.

## **4. Terms of Payment:**

The terms of payment under the Contract shall be on **milestone basis** against achievement of defined stages of progress under the EPC / turnkey Contract. No item-wise payment shall be made on the basis of individual BOQ items, supply quantities, erection quantities or actual measurement of isolated items, except where expressly provided elsewhere in the Contract.

Payment shall be released by the Owner subject to availability of funds, certification by the Engineer-in-Charge, submission of valid invoices and supporting documents, and fulfillment of all contractual conditions applicable to the relevant milestone.

The milestone payment schedule shall be as follows:

**(i) Mobilization Advance:** Ten percent (10%) of the total Contract Price may be paid as Mobilization Advance against submission of an unconditional Bank Guarantee of

equivalent amount from a scheduled bank, valid for such period as may be required by the Owner, within fifteen (15) days from signing of the Contract Agreement, subject to availability of funds and approval of the Engineer-in-Charge.

The Mobilization Advance shall be treated strictly as an advance payment and shall not constitute a separate milestone payment. The Mobilization Advance shall be recovered progressively from subsequent running bills on pro-rata basis, or in such manner as may be decided by the Engineer-in-Charge, until fully adjusted. The Bank Guarantee against Mobilization Advance shall be released only after full recovery of the advance. It shall be interest bearing at the rate prescribed by Government/ Department or as specified in the LOA and interest shall be recovered along with advance.

**(ii) Milestone-1:** Survey, Detailed Engineering and Approval of Drawings / GTP

Ten percent (**10%**) of the total Contract Price shall be payable upon completion of detailed survey, route verification, detailed engineering, submission and approval of drawings, design calculations, data sheets and Guaranteed Technical Particulars (GTPs), as applicable under the Contract, and certification thereof by the Engineer-in-Charge.

**(iii) Milestone-2:** Supply and Delivery of Major Materials and Equipment at Site

Thirty percent (**30%**) of the total Contract Price shall be payable upon supply and delivery of major materials, equipment and systems at site in good condition, including verification of quantities, receipt records, inspection clearances wherever applicable, and certification by the Engineer-in-Charge.

**(iv) Milestone-3:** Erection, Installation, Stringing, Integration and Completion of Major Physical Works

Forty percent (**40%**) of the total Contract Price shall be payable upon completion of major physical works, including erection, installation, reconductoring, stringing, mounting, cabling, terminations, integration and associated field activities, to the extent required under the Contract and duly certified by the Engineer-in-Charge.

**(v) Milestone-4:** Testing, Commissioning and Successful Charging

Ten percent (**10%**) of the total Contract Price shall be payable after completion of testing, pre-commissioning checks, relay and communication tests, SCADA verification, synchronizing checks, end-to-end functionality checks, successful commissioning and charging of the complete system, and certification thereof by the Engineer-in-Charge.

**(vi) Milestone-5:** Final Acceptance

Ten percent (**10%**) of the total Contract Price shall be payable after successful operation during the prescribed observation period for one month from the date of successful commissioning/charging or as directed by the Engineer in Charge,

rectification of defects, submission of all completion documents including as-built drawings, manuals, test reports and handing over of the works to the Owner, and issuance of Final Acceptance / Completion certification by the Engineer-in-Charge.

All payments shall be subject to deductions, recoveries, adjustment of Mobilization Advance, statutory deductions, taxes and levies as applicable under the Contract.

Approval of any invoice, milestone certificate, drawing, GTP, document or stage payment shall not relieve the Contractor of any responsibility or liability under the Contract. The Contractor shall remain fully responsible for the complete and satisfactory performance of the entire EPC works.

#### **5. Mode of Payment:**

Payments shall be made subject to availability of fund by the Owner at the receipt of the Tenderer's invoice, complete in all respects and supported by the requisite documents and fulfillment of stipulated conditions, if any. All the payment shall be released to the Contractor directly.

All invoices under the Contract shall be raised by the Tenderer on "the Owner" and all payments shall be made to the Contractor by the Owner.

#### **6. Target Date of Completion:**

The work should be completed within 9 months from the Effective Date of the Contract as specified in the Contract Agreement.

#### **7. Extension of Time:**

If the supply of equipment or execution of the works is delayed due to reasons beyond the control of the Contractor, the Contractor shall, without delay and in any case within thirty (30) days of occurrence of the event causing delay, give notice in writing to the Purchaser with full particulars and supporting documents in support of his claim for extension of time.

The Purchaser, on receipt of such notice and after examination of the circumstances, may grant such reasonable extension of the Contract Completion Date as may be justified. In case of Force Majeure or any such circumstances accepted by the Purchaser as beyond the control of the Contractor, extension of time may be granted without levy of Liquidated Damages. In all other cases, extension of time, if granted, may be with Liquidated Damages, as decided by the Purchaser.

#### **8. Defect Liability Period:**

"Defect Liability Period" means 12 calendar months commencing strictly from the date of issuance of the Taking Over Certificate/Final Acceptance of the Project by the Owner.

The Contract shall not be considered completed until a Defects Liability Certificate shall have been signed by the Engineer-in-Charge and delivered to the Contractor

stating the date on which the Contractor shall have completed his obligations to execute and complete the Works and remedy any defects there in to the Engineer's satisfaction. The Defects Liability Certificate shall be given by the Engineer within 28 days after the expiration of the Defects Liability Period, or, if different defects liability periods shall become applicable to different sections or parts of the Permanent Works, the expiration of the latest such period, or as soon thereafter as any works instructed, pursuant to relevant clauses of this Chapter have been completed to the satisfaction of the Engineer-in-Charge.

Notwithstanding the issue of the Defects Liability Certificate, the Contractor and the Owner shall remain liable for the fulfillment of any obligation incurred under the provisions of the Contract prior to the issue of the Defects Liability Certificate which remains unperformed at the time such Defect Liability Certificate is issued and for the purposes of determining the nature and extent of any such obligation, the Contract shall be deemed to remain in force between the parties.

If it appears to the Engineer or his Representative at any time during construction or reconstructions or prior to the expiry of the Defects Liability Period, as specified or 12 (twelve) calendar months from the certified date of final completion of entire work covered under the Contract, that any work has been executed with unsound, imperfect, or unskilled workmanship or that any materials or articles provided by the Tenderer for execution of the work are unsound or of a quality inferior to that contracted for, or otherwise not in accordance with the Contract or that any defect, shrinkage or other faults in the work arising out of defective or improper materials or workmanship, the Contractor shall upon receipt of a notice in writing on that behalf from the Engineer, forthwith rectify or remove or reconstruct the works so specified in whole or in part as the case may be and/or remove that material/articles so specified and provide other proper and suitable materials at his own expense at the satisfaction of the Engineer in Charge.

#### **9. Completion of the work:**

The work shall be completed to the entire satisfaction of the Engineer and in accordance with the time stipulated in the Contract. The works shall be deemed complete only after completion of all supply, erection, installation, testing, commissioning, successful operation and performance demonstration, submission of all drawings, manuals, test reports, as-built documents and clearance of the site in all respects.

As soon as the work under the Contract is substantially completed as a whole, the Contractor shall give notice of such substantial completion to the Engineer together with an undertaking to complete any outstanding work during the Defect Liability

Period. The Engineer shall, within 30 days of receipt of such notice, inspect the works and, if satisfied that the works have been substantially completed in accordance with the Contract, issue to the Contractor a Certificate of Completion indicating the date of completion. If defects or incomplete items are noticed, the Engineer shall issue a written notice requiring rectification / replacement / completion within such time as may be specified, and upon compliance and further notice by the Contractor, the Engineer shall inspect and issue the Completion Certificate accordingly.

No Certificate of Completion shall be issued and no work shall be considered completed unless the Contractor has removed from the site and / or premises all temporary arrangements, surplus materials, debris, tools, plants and belongings brought by him for execution of the work and has cleared the site in all respects to the satisfaction of the Engineer. If the Contractor fails to do so, the Engineer may, at the risk and cost of the Contractor, carry out such clearance and recovery shall be made from dues payable to the Contractor.

**10. Taking over:**

- i) The work shall be taken over from the Contractor by the Owner after successfully commissioning and completion of Milestone 5/Final Acceptance.
- ii) The issuance of a Taking over Certificate shall in no way relieve the Contractor of his responsibility for the satisfactory operation of the equipment in terms of the specifications.

**11. Insurance of Equipment:**

The materials and equipment shall be fully insured by the Contractor against damage, lost, pilferage etc. in transit. Insurance Document should be sent along with evidence of dispatch. The insurance shall cover the entire project duration till Defect Liability Period.

**12. Replacement:**

If the materials/equipment or any portion thereof is damaged or lost before taking over of the work by the Owner, the replacement of such materials/equipment shall be rectified by the Contractor within a specified time to avoid unnecessary delay in the commissioning of the materials and equipment. The replacement of materials/equipment damaged shall be made free of cost by the Contractor.

**13. Rejection:**

In the event that any portion of the works carried out by the Contractor is found below standard or otherwise not in conformity with the requirements of the Contract Specifications, the Purchaser shall request the Contractor in writing to rectify the same. The Contractor on receipt of such notification shall rectify the work free of cost to the Purchaser. If the Contractor fails to do so, the Purchaser may:

- a) at its option replace or rectify such defective work and recover the extra cost so involved from the Tenderer plus 15% of the defective work
- b) terminate the Contract.

#### **14. Inspection& Testing During Manufacture:**

- i) The Purchaser's representative shall be entitled at all reasonable times during manufacture to inspect, examine and test on the Contractor's premises the material, manpower and workmanship of all equipment to be supplied under this Contract by the Contractor and if part of the said equipment is being manufactured on other premise, the Contractor shall obtain for the Purchaser's representative permission to, inspect, examine, and test as if the equipment were being manufactured on the Contractor 's premises. Such inspection, examination and testing shall not release the Contractor from his obligations under this Contract.
- ii) The Contractor shall give the Purchaser's Representative thirty (30) days notice in writing of the date and the place at which the materials and equipment will be ready for testing. All the materials shall be inspected and tested after completion before dispatch at the manufacturer's site.
- iii) Inspection and Testing will be at the cost of Contractor including providing assistance for labour, materials, electricity, fuel and instrument as may be required or as may be reasonably demanded by the Purchaser's Representative to carry out such tests efficiently. Transportation, Food and Lodging of the Purchaser's Representative will also be borne by the Contractor.
- iv) When the equipment has passed the specified tests, the Purchaser's Representative shall furnish a Certificate to his effect in writing to the Contractor. The Contractor shall provide reasonable copies of the Test Certificates to the Purchaser.

#### **15. Guarantee:**

The Contractor shall provide a guarantee for the materials and equipment supplied for a period of 12 (twelve) months. This Guarantee period shall run concurrently with the Defect Liability Period after formal taking over of the Project by the Owner.

During the guarantee period, the Contractor shall remedy, at his own expense, all defects in design, materials and workmanship that may develop under normal use upon written notice from the Purchaser, who shall indicate in what respect the equipment is faulty. The provisions of this clause, including transportation and all associated costs, shall be complied with within the period specified by the Purchaser.

#### **16. Force Majeure:**

The term 'Force Majeure' shall herein mean Riots (other than among the Contractor's Employees), Civil Commotion (to the extent not Insurable), War (whether declared or not), Invasion, Act of Foreign Enemies, Hostilities, Civil War, Rebellion, Revolution, Insurrection, Military or Usurped Power, Damage from Aircraft, Nuclear Fission, such as Earthquake (above 7 Magnitude on Richter Scale), Lightning, Unprecedented Floods, Fires not caused by Contractor 's negligence and other such causes over which the Contractor has no control and are accepted as such by the Purchaser, whose decision shall be final and binding.

In the event of either party being rendered unable by Force Majeure to perform any obligation required to be performed by them under this Contract, the relative obligation of the Party effected by such Force majeure shall be treated as suspended for the period during which such Force Majeure cause lasts, provided the Party alleging that it has been rendered unable as aforesaid, thereby shall notify within 10 days of the alleged beginning and ending thereof giving full particulars and satisfactory evidence in support of such cause. The Purchaser shall verify the facts and grant such extension or as the case may be as fact justify.

**17. Payment due from the Contractor:**

All cost and damages for which the Contractor is liable to the Purchaser including a recovery of advance will be deducted by the Purchaser from any amount due to the Contractor under the Contract.

If for any unavoidable reasons, payment is delayed, the Contractor shall neither charge any interest for the delay in payment nor the Contractor shall stop the contract work on account of this.

**18. Performance Bond or Bank Guarantee for Security:**

At the time of signing the Contract, the Contractor shall provide the Purchaser with Security Deposit for a Performance Bond or a Performance Bank Guarantee for an amount of 10% (Ten percent) of the total accepted value of the works in the form of Demand Draft/Fixed Deposit Receipt, Banker's Cheque, Bank Guarantee, Insurance Surety Bond pledged in favour of the Engineer-in-Chief, Power & Electricity Department, Government of Mizoram.

It shall remain valid for a period of 60 days beyond the date of completion of all contractual obligations of the contractor including Defect liability Period.

This Bond or Guarantee will be released at the end of the Guarantee Period/Defect Liability Period and on written request by the Contractor. Failure to submit Performance Guarantee shall leads to automatic forfeiture of EMD. Form of Bank Guarantee attached.

**19. Delay in Completion:**



If the Contractor fails to complete the work within the time specified in the Contract Agreement or extension of time without Liquidated Damage, the Purchaser shall recover from the Contractor as liquidated damages a sum of one half of one percent (0.5 %) of the Total Contract Price, for each week (7 days) of delay from the expiry of Scheduled Date of Completion. The total Liquidated Damages shall not exceed 10% (ten percent) of the Total Contract Price to be finalized by the purchaser.

## **20. Contractor's Default & Liability:**

The Purchaser may, upon written notice of default to the Contractor, terminate the Contract in whole or in part in any of the following circumstances:

- (a) if, in the judgment of the Purchaser, the Contractor fails to complete the work within the time specified in the Contract Agreement or within the period for which extension has been granted by the Purchaser; or
- (b) if, in the judgment of the Purchaser, the Contractor fails to comply with any of the other provisions of the Contract.

In the event the Purchaser terminates the Contract in whole or in part under this clause, the Purchaser reserves the right to procure, upon such terms and in such manner as he may deem appropriate, materials and equipment similar to those so terminated, and the Contractor shall be liable to the Purchaser for any additional cost and for delay damages until such reasonable time as may be required for completion/ procurement of the same.

If the Contract is terminated under this clause, the Purchaser may require the Contractor to transfer title and deliver to the Purchaser:

- (i) any completed materials and equipment; and
- (ii) such partially completed materials and equipment, drawings, information and contract rights as the Contractor has specifically produced or acquired for performance of the Contract. The Purchaser shall pay the Contract Price for completed materials and equipment delivered to and accepted by the Purchaser and for manufacturing material delivered and accepted.

If the Purchaser does not terminate the Contract as provided herein, the Contractor shall continue performance of the Contract and shall remain liable to the Purchaser for liquidated damages for delay as set out in Clause 19 until the equipment and works are accepted.

## **21. Termination of the Contract:**

If the Contractor finds it impracticable to continue operations or if, owing to Force Majeure or any cause beyond the control of the parties, the Purchaser finds it impossible to continue operations, prompt notification in writing shall be given by the affected party to the other.



If the delay or difficulties so caused cannot reasonably be expected to cease or become avoidable, or if operations cannot be resumed within six (6) months, either party shall have the right to terminate the Contract upon ten (10) days' written notice to the other. In the event of such termination, payment to the Contractor shall be made as follows:

- (a) the Contractor shall be paid for all materials and equipment approved by the Purchaser's Representative and for any other legitimate expenses due to him;
- (b) if the Purchaser terminates the Contract owing to Force Majeure or due to any cause beyond his control, the Contractor shall additionally be paid for work done during the said six months' period including financial commitments properly made for performance of the Contract and not reasonably defrayed by payments under item (a); and
- (c) the Purchaser shall release all bonds and guarantees at its disposal except in cases where the amount already paid to the Contractor exceeds the final amount due, in which case the Contractor shall refund the excess within sixty (60) days, failing which recovery may be made from the bonds or guarantees furnished.

On termination of the Contract for any cause, the Contractor shall arrange orderly suspension and termination of operations with due regard to the interests of the Purchaser in safeguarding, storing and preserving equipment produced for performance of the Contract and in facilitating salvage and resale thereof.

If the qualifying documents submitted by the Contractor are found to be fake or forged, the Contract may be terminated forthwith at any time during execution, without prejudice to other actions permissible under law and the applicable tender rules.

## **22. Powers of the Engineer upon Termination:**

- i) To take possession of the site of Work under the Contract as well as the Land/Premises allotted to the Tenderer for his preliminary, enabling and Works and
- ii) To take possession of any Materials, Constructional Plant, Equipment, Implements, Stores, Structures etc. thereon.

The Engineer shall also have powers to carry out the incomplete Work by any means or through any other Agency or by himself at the risk and cost of the Contractor. In such a case, the value of the Work done through such agencies shall be credited to the Contractor at his Contract prices and the Contractor shall pay the excess amount, if any incurred in completing the Work as aforesaid as stipulated herein.

On termination of the Contract in full or in part, the Engineer may direct that a part or whole of such Sub-Station, Equipment and Materials, Structures be removed from the site of the Work as well as from the land/premises allotted to the Contractor for his preliminary, enabling and ancillary Works, within a stipulated period. If the Contractor

fails to do so within the period specified in a written notice, the Engineer may cause the same to be sold, and the net proceeds of sale shall be adjusted against amounts due under the Contract.

If the expenses incurred or to be incurred by the Department for carrying out and completing the incomplete work are in excess of the value of the work credited or to be credited to the Contractor, the difference shall be paid by the Contractor to the Department. If the Contractor fails to pay such amount within thirty (30) days of receipt of notice in writing, the Engineer shall be empowered to recover such amount from any sums due to the Contractor under this or any other Contract, from the Security Deposit or otherwise.

The Engineer shall also have the right to sell any or all unused materials, construction plant, equipment, implements and temporary buildings / structures of the Contractor and apply the proceeds thereof towards satisfaction of sums due from the Contractor under the Contract. Subject to the Contract and applicable law, decisions of the Engineer under this clause shall be binding on the Contractor.

### **23. Bankruptcy**

If the Contractor becomes bankrupt or has a receiving order made against him, or compounds with his creditors, or, being a corporation, commences to be wound up otherwise than for purposes of amalgamation or reconstruction, or carries on business under a receiver for the benefit of creditors, the Purchaser shall be at liberty:

- (a) to terminate the Contract forthwith by notice in writing to the Contractor or to the liquidator or receiver or to any person in whom the Contract may become vested and to act in the manner provided in Clause 21 as though the said notice had been issued thereunder; or
- (b) to give such liquidator, receiver or other person the option of carrying out the Contract subject to his providing a guarantee for due and faithful performance of the Contract up to an amount to be determined by the Purchaser.

### **24. Contingent Fees**

The Contractor warrants that he has not employed any person to solicit or secure the Contract upon any agreement for a commission, percentage, brokerage or contingent fee. Breach of this warranty shall give the Purchaser the right to cancel the Contract or to take such other measure as the Purchaser may deem fit. This warranty shall not apply to commissions payable by the Contractor to established commercial or selling agents for the purpose of securing business.

### **25. Non-Assignment**

The Contractor shall not assign or transfer the Contract or any part thereof without the prior written approval of the Purchaser.

## **26. Certificate Not to Affect Rights of the Purchaser or the Contractor**

Issue of any certificate by the Purchaser or grant of any extension of time by the Purchaser shall not prejudice the rights of the Purchaser under the Contract, nor shall the same relieve the Contractor of his obligations for due performance of the Contract.

## **27. Settlement of Disputes**

Except as otherwise specifically provided in the Contract, all disputes concerning questions of fact arising under the Contract shall initially be referred to the Purchaser for decision. The parties shall first attempt to settle amicably all disputes or differences arising out of or in connection with the Contract. If amicable settlement cannot be reached within a reasonable time, the disputes shall be referred to arbitration in accordance with Clause 28.

## **28. Arbitration**

If at any time any question, dispute or difference whatsoever arises between the Contractor and the Purchaser upon, in relation to or in connection with this Contract, either party may give to the other notice in writing of the existence of such question, dispute or difference, and the same shall be referred to arbitration in accordance with the Arbitration and Conciliation Act, 1996 and statutory modifications thereof.

Unless otherwise agreed by the parties, the dispute shall be referred to a sole arbitrator appointed in accordance with applicable law. The seat and place of arbitration shall be Aizawl, Mizoram, and the proceedings shall be conducted in English. The award of the arbitrator shall be final and binding on the parties.

The cost of and incidental to the arbitration and award shall be at the discretion of the arbitrator.

The work under this Contract shall, if reasonably possible, continue during arbitration proceedings, and no payments due from or payable by the Purchaser shall be withheld on account of such proceedings except to the extent which may be in dispute.

## **29. Jurisdiction**

No legal proceedings shall be taken to enforce any claim and no suit arising out of any conflict shall be instituted except in a court of competent jurisdiction located within Mizoram.

## **30. Language and Measure**

All documents pertaining to the Contract including Specifications, Schedules, Notices, Correspondence, Operating and Maintenance Instructions, Drawings and any other writings shall be in English language. The Metric System of measurement shall be used exclusively in this Contract.

## **31. Correspondence**

- i) Any notice to the Contractor under the terms of the Contract shall be served by registered mail, speed post, courier, electronic mail where accepted, or by hand at the Contractor's principal place of business or registered office.
- ii) Any notice to the Purchaser shall be served at the Purchaser's principal office in the same manner.

### **32. Consignee and Paying Authority**

The consignee and paying authority for the Contract shall be as specified in the Contract Agreement, Letter of Award, Special Conditions of Contract or relevant schedule / annexure. Unless otherwise specified, the paying authority shall be the Engineer-in-Chief, Power & Electricity Department, against duly passed bills received from the concerned Executive Engineer, and the consignee shall be the concerned field office / sub-divisional officer as applicable to the work.

### **33. Legal Addresses of the Parties**

The legal addresses of the parties to the Contract shall be as stated in the Contract Agreement. Unless otherwise amended in writing, the Purchaser shall be the Engineer-in-Chief, Power & Electricity Department, Government of Mizoram, Aizawl, and the Contractor shall be the address stated in the bid and Contract Agreement.

### **34. Additional Project-Specific Provisions**

(i) Change in Law / Tax Variation: Any change in taxes, duties or statutory provisions after the last date of bid submission and having direct impact on the Contract shall be adjusted accordingly in terms of law and documentary evidence.

(ii) Safety and Statutory Compliance: The Contractor shall be solely responsible for safety of personnel, equipment and works and shall comply with all statutory safety regulations, labour laws, electricity rules, environmental requirements and instructions of the Engineer-in-Charge. Any accident, damage or claim arising out of execution of the work shall be to the Contractor's account, except to the extent attributable to the Employer.

(iii) Drawings, GTPs and Approvals: The Contractor shall submit GTPs, drawings, data sheets, manuals and other documents for approval. Manufacture, supply or execution affecting approved design shall not proceed without required approvals, except at the Contractor's own risk where specifically permitted.

(iv) Final Acceptance: Final acceptance of the works shall be only after successful commissioning, integration, performance verification, submission of all completion documents and as-built drawings, rectification of defects and formal handing over to the Department.

## **SECTION – IV**

### **SPECIAL CONDITIONS OF CONTRACT (SCC)**

#### **1. INTERFACE RESPONSIBILITY**

The Contractor shall be solely responsible for complete integration of HTLS line, OPGW communication system, line differential protection, DTPC, SCADA and synchronizing system. No claim on account of interface mismatch shall be entertained.

#### **2. END-TO-END SYSTEM PERFORMANCE**

The Contractor shall ensure successful end-to-end operation of the entire system including protection, communication and synchronization. Failure of any subsystem affecting overall performance shall be treated as failure of the Contract.

#### **3. SHUTDOWN COORDINATION**

All shutdowns shall be planned and coordinated by the Contractor with SLDC and field authorities. Delay due to improper planning shall be to Contractor's account.

#### **4. OPGW & PROTECTION INTEGRATION**

The Contractor shall ensure reliable communication link for protection system. Optical link budget, splice losses and redundancy shall be within acceptable limits for successful relay operation.

#### **5. SCADA COMPATIBILITY**

All supplied equipment shall be compatible with existing SCADA system and protocols. Any additional hardware/software required for integration shall be deemed included in the scope.

#### **6. SYNCHRONIZING SYSTEM RESPONSIBILITY**

The Contractor shall ensure correct functioning of synchronizing scheme including voltage, frequency and phase matching logic before breaker closing.

#### **7. DETAILED ENGINEERING SUBMISSION**

Detailed engineering including GTP, drawings and calculations shall be submitted within specified time. Delay shall directly affect project schedule and shall be Contractor's responsibility.

#### **8. COMPLETION CRITERIA (PROJECT SPECIFIC)**

The project shall be considered complete only after successful integration and operation of all systems together, and not merely individual equipment commissioning. The Contractor shall provide adequate training to departmental personnel before handing over.

#### **9. DATA & DOCUMENT COMPATIBILITY**

All data, settings, configurations and documentation shall be compatible with existing departmental systems and formats.

**10. NO EXTRA CLAIM**

No additional payment shall be made for any item required for successful integration, operation and commissioning of the complete system, whether explicitly mentioned or not.

**11. TYPE TEST REPORT**

The bidder shall submit available valid type test reports for major offered equipment along with the bid. Where exact type test reports are not available at bidding stage, the bidder may submit type test reports of similar or higher-rated equipment for preliminary review. The successful bidder shall submit complete type test reports for the offered equipment after award and before manufacture/supply. The Employer may require fresh type tests at no extra cost if the submitted reports are not acceptable.

**12. GTP**

The bidder shall submit Preliminary Guaranteed Technical Particulars (GTP) for all major equipment along with the bid. The Preliminary GTP shall form the basis for technical evaluation and shall be binding on the bidder.

The successful bidder shall submit detailed Final GTP, drawings, and design data within 30 days of award for approval. The Final GTP shall be consistent with the Preliminary GTP and no adverse deviation shall be permitted.

Manufacturing shall be taken up only after approval of the Final GTP, which shall form part of the Contract.

**SECTION V**  
**TECHNICAL SPECIFICATION**  
**SL. NO. 1 - HTLS (ACSS PANTHER) CONDUCTOR SYSTEM**

---

**1. General**

1.1 The work under this section shall cover design, engineering, manufacture, testing at works, packing, supply, transportation, delivery at site, unloading, insurance, handling, storage, erection, stringing, sagging, clipping, jointing, testing and commissioning of HTLS conductor complete with all conductor accessories, fittings, hardware and consumables required for successful re-conductoring of the 132kV lines covered under the project.

1.2 The conductor to be supplied shall be High Temperature Low Sag type, namely ACSS Panther equivalent to Panther size, suitable for continuous operation at elevated temperature without unacceptable loss of mechanical strength or excessive creep and sag.

1.3 The Contractor shall be responsible for the complete re-conductoring package including survey of the existing line, verification of suitability of existing towers and insulator strings for the proposed conductor, preparation of stringing plan, tension chart, sag chart, shutdown planning, dismantling of existing conductor where required, and restoration of the line to safe operational condition.

1.4 The offered conductor system shall be suitable for operation on 132kV transmission lines in the tropical, humid and hilly environmental conditions prevailing in Mizoram and shall withstand the maximum operating temperature, wind loading, vibration, handling stresses and all service conditions envisaged in the contract.

1.5 All items not specifically mentioned but necessary for safe and satisfactory installation, operation and performance of the HTLS conductor system shall be deemed to be included in the Contractor's scope.

**2. Applicable Standards**

2.1 Unless otherwise specified herein, the HTLS conductor, galvanized steel components, aluminium strands, conductor accessories, vibration dampers, mid-span joints, dead-end assemblies and stringing equipment shall conform to the latest editions, including amendments up to the date of bid opening, of the relevant IEC, IS, ASTM and other internationally recognized standards.

2.2 The principal standards shall include, as applicable, IS 398, IEC 61089, ASTM B857 or equivalent for ACSS conductor, IS 2486 for insulator fittings interface where relevant, IS 4826 and IS 2633 for galvanization related requirements, IEC 61284 for

overhead line fittings tests, and other standards specifically applicable to the offered conductor and accessories.

2.3 In the event of any contradiction between this specification and the applicable standards, the more stringent requirement shall prevail. Nothing in this specification shall be construed to relieve the Contractor of responsibility for furnishing equipment and materials of proven design and satisfactory performance.

### **3. Conductor Construction and Design Requirements**

3.1 The conductor shall be ACSS Panther type comprising round hard drawn or fully annealed aluminium strands over a galvanized steel core, specifically designed for HTLS service and capable of sustained operation at high temperature with reduced sag characteristics compared with conventional ACSR under equivalent loading conditions.

3.2 The conductor size shall correspond to Panther class and, unless otherwise approved, shall be ACSS 30/7/290 or equivalent matching the project requirement. The exact strand construction, cross-sectional area and diameter shall be clearly declared in the guaranteed technical particulars.

3.3 The nominal aluminium area, steel area, overall diameter, mass per kilometre, rated tensile strength, modulus of elasticity, coefficient of thermal expansion, DC resistance at 20°C, current carrying capability and continuous maximum operating temperature shall be declared by the manufacturer and shall be supported by type test reports or authenticated design calculations.

3.4 The conductor shall be suitable for continuous operation at conductor temperature not less than 150°C unless a higher temperature is specifically offered and accepted. The conductor shall maintain satisfactory mechanical and electrical performance throughout the specified temperature range and under the loading conditions applicable to the line.

3.5 The aluminium strands shall be free from defects, seams, inclusions, scratches and other imperfections and shall be laid concentrically with uniform pitch. The steel core strands shall be of adequate mechanical strength and corrosion protection to ensure long service life in the specified environment.

### **4. Mechanical and Electrical Characteristics**

4.1 The final sag-tension design shall be based on the actual properties of the offered ACSS conductor and on the ruling span, wind span and weight span of the existing line sections. The Contractor shall submit detailed sag-tension calculations for approval before commencement of stringing works.

4.2 The rated tensile strength of the conductor shall be adequate for the stringing tensions and service loads. The everyday tension, maximum stringing tension and final



unloaded tension shall be selected to ensure that statutory clearances, tower loading limits and safety margins are fully maintained.

4.3 The ultimate tensile strength of the conductor shall be equal to or greater than that of ACSR Panther conductor. The conductor shall retain adequate mechanical strength at elevated temperatures and shall maintain at least 70 percent of its ultimate tensile strength at maximum operating temperature.

4.4 The conductor shall have low creep and stable performance under long-term high temperature operation. The Contractor shall furnish creep data, stress-strain characteristics and temperature-sag characteristics for design and field verification.

4.5 The conductor shall be capable of carrying a minimum continuous current of 800 amperes under the specified service conditions.

4.6 The DC resistance of the conductor at 20°C shall be guaranteed. The current carrying capacity shall be derived considering the offered conductor properties, maximum permissible conductor temperature, emissivity, absorptivity and relevant weather assumptions.

4.7 AC resistance at maximum operating temperature shall also be provided. The AC resistance of the offered conductor shall be lower than that of conventional ACSR Panther conductor and shall be supported by calculation and technical data.

4.8 Corona performance and radio interference performance shall be suitable for 132kV service. The conductor surface and joints shall not give rise to objectionable corona or localized heating in service.

## **5. Raw Materials and Galvanization**

5.1 Aluminium strands shall be of suitable grade for ACSS conductor manufacture and shall comply with the relevant mechanical and conductivity requirements of the applicable standards. The steel core shall consist of zinc coated steel wires of uniform quality and adequate ductility.

5.2 Zinc coating on steel wires and all ferrous hardware shall be hot dip galvanized. The galvanization shall be smooth, continuous, adherent and of uniform thickness and shall meet the coating mass and adhesion requirements of the applicable standards.

5.3 All conductor accessories and hardware exposed to atmosphere shall be corrosion resistant and shall be designed for long life under humid and high rainfall conditions. Dissimilar metal contact likely to cause galvanic corrosion shall be avoided or properly protected.

## **6. Conductor Accessories and Fittings**

6.1 The Contractor shall supply all accessories and fittings required for the HTLS conductor package, including but not limited to suspension clamps, dead-end clamps, mid-span compression joints, repair sleeves, armour rods if required, vibration

dampers, spacers if required, jumper terminals, PG clamps where applicable, shackle links, extension links, yoke plates, fasteners, conductor marking devices and all consumables.

6.2 All fittings shall be specifically designed and proven for the offered ACSS conductor and shall be suitable for high temperature operation. Accessories intended for conventional ACSR service shall not be used unless they are demonstrably suitable for the offered HTLS conductor and are expressly approved.

6.3 Mid-span compression joints shall be of non-tension type or full tension type, as applicable to the location, and shall restore the electrical and mechanical performance required by the relevant standards. Full tension dead-end assemblies and joints shall develop not less than 95% of the rated tensile strength of the conductor unless a more stringent requirement is specified by the relevant standard.

6.4 Suspension clamps and dead-end clamps shall be designed so as not to damage aluminium strands during installation or operation and shall ensure uniform stress distribution. The slip strength of suspension assemblies shall be appropriate for the conductor and line design.

6.5 Vibration dampers shall be of proven stockbridge type or equivalent approved design and shall be selected based on the actual conductor diameter, tension range and span configuration. The number and placement of dampers shall be established by the Contractor and submitted for approval.

6.6 Repair sleeves shall be suitable for emergency restoration and minor strand damage conditions in accordance with the manufacturer's recommendations and standard practice.

## **7. Stringing, Sagging and Installation Requirements**

7.1 Stringing of the HTLS conductor shall be carried out using approved tension stringing methods so that the conductor does not touch the ground, trees, structures or any object that may damage the conductor surface or cause contamination.

7.2 The Contractor shall use suitable stringing blocks, tensioners, pullers, hydraulic compressors, come-alongs, conductor grips and all special tools specifically recommended for ACSS conductor. Tools and clamps not suitable for HTLS conductor shall not be used.

7.3 The sag of the HTLS conductor at maximum operating temperature shall not exceed the sag of ACSR Panther conductor at 75°C under identical loading conditions

7.4 Sagging shall be done strictly in accordance with the approved sag-tension chart and at the corrected conductor temperature. Final sag shall be checked span-wise and

adjusted wherever required to achieve statutory ground clearance, crossing clearance and inter-phase clearance.

7.5 Compression of dead-end joints, mid-span joints and repair sleeves shall be performed with dies and hydraulic machines recommended by the accessory manufacturer. Each compression location shall be properly recorded and visually inspected.

7.6 Proper precautions shall be taken during dismantling of the old conductor and stringing of the new conductor to avoid damage to towers, insulators, OPGW, existing earthwire, adjacent energized lines, roads, rivers, buildings and vegetation.

7.7 The Contractor shall prepare detailed method statements covering shutdown requirements, safety precautions, traffic management, tower access, handling in steep terrain, crossing protection, emergency restoration and quality control during stringing operations.

## **8. Performance Requirements**

8.1 The completed conductor system shall be capable of continuous and reliable service on the specified 132kV line sections without abnormal heating, unacceptable sag, excessive aeolian vibration, fretting fatigue or premature deterioration.

8.2 The conductor shall be designed for continuous operation at elevated temperature of not less than 150°C.

8.3 After completion of high temperature creep testing, the conductor shall retain not less than 95 percent of its original tensile strength.

8.4 The conductor and fittings shall withstand the mechanical stresses occurring during transport, handling, erection, service, short-duration emergency loading and maintenance activities.

8.5 All fittings shall be corona free, mechanically secure and electrically sound. Hot spots, loose hardware, damaged strands, inadequate compression and improper clamping shall not be acceptable.

8.6 The Contractor shall ensure compatibility of the offered conductor system with the existing tower geometry, insulator assemblies, electrical clearances and protection requirements of the line.

## **9. Inspection and Tests**

9.1 All conductor and accessories shall be subject to inspection and testing by the Employer or Employer's representative at the manufacturer's works without additional cost. The Contractor shall give adequate notice of readiness for inspection.

9.2 Routine tests, acceptance tests and type tests applicable to conductor and fittings shall be carried out in accordance with the relevant standards and this

specification. No material shall be dispatched without satisfactory test results and inspection clearance where required.

9.3 Routine and acceptance tests on conductor shall include verification of dimensions, lay ratio, strand diameter, mass, resistance, zinc coating, breaking load and workmanship. Fittings shall be tested for dimensional checks, galvanization, proof load, slip strength, ultimate strength and electrical performance as applicable.

9.4 Type tests for conductor and accessories shall include, as relevant, stress-strain test, creep test, temperature-sag test, tensile test, conductivity test, vibration test, corona and radio interference test if applicable, short-time current test where relevant, and mechanical/electrical tests on conductor accessories in accordance with IEC 61284 or equivalent.

9.5 Type test reports shall preferably be from NABL accredited or internationally recognized laboratories and shall not be older than five years from the date of bid opening unless specifically accepted by the Employer.

## **10. Documentation to be Submitted**

10.1 Along with the bid, the bidder shall furnish filled-in guaranteed technical particulars, descriptive literature, conductor data sheets, accessory data sheets, list of type tests, catalogues, installation recommendations and deviations, if any.

10.2 After award of contract, the Contractor shall submit detailed drawings, stringing charts, sag-tension tables, loading calculations, accessory layout, compression schedule, quality assurance plan, field quality check formats and installation manuals for approval.

10.3 Before commissioning, the Contractor shall submit inspection reports, routine and acceptance test certificates, material dispatch records, site test reports, tower-wise stringing records, joint location records and as-built documents.

## **11. Packing, Transportation and Storage**

11.1 The conductor shall be supplied in robust non-returnable drums properly lagged and protected against damage during transit, storage and handling. Each drum shall carry clear and permanent markings indicating contract number, manufacturer's name, conductor type, gross weight, net weight, length, drum number and rolling direction.

11.2 Accessories shall be packed in strong weather-resistant packages with identification tags and packing lists. Small items shall be boxed to prevent loss in transit.

11.3 Materials shall be stored at site on suitable supports and protected against water logging, contamination, impact, mishandling and theft. Damaged conductor drums or accessories shall be rejected or rectified only after approval.

## 12. Site Tests and Commissioning

12.1 After stringing and before energization, the complete line section shall be jointly inspected. The inspection shall cover conductor condition, correct sag, hardware tightness, jumper arrangement, damping arrangement, compression quality, clearances, phasing and general workmanship.

12.2 The Contractor shall carry out continuity checks, infrared thermography after charging when possible, visual inspection under load and any other tests necessary to establish the satisfactory performance of the re-conductored line.

12.3 Any defects noticed during inspection, testing, trial charging or defect liability period and attributable to design, materials or workmanship shall be rectified by the Contractor at no extra cost.

## 13. Guaranteed Technical Particulars

### A. Electrical Characteristics

Parameter	Unit	Bidder Value
DC Resistance @20°C	Ohm/km	
AC Resistance	Ohm/km	
Current Capacity @150°C	Amp	
Corona Extinction Voltage	kV	
RIV	μV	

### B. Thermal Characteristics

Parameter	Unit	Value
Max Continuous Temp	°C	≥150
Emergency Temp	°C	210
Thermal Expansion	/°C	

### C. Mechanical Characteristics

Parameter	Unit	Value
Diameter	mm	
Weight	kg/km	
UTS	kN	
Modulus	GPa	
Stranding	-	

**D. Sag-Tension Data**

Parameter	Unit	Value
EDT	%UTS	
Max Tension	%UTS	
Sag @75°C	m	
Sag @150°C	m	
Sag @200°C	m	

**E. Short Circuit Capability**

Parameter	Unit	Value
Short Circuit Current	kA	
Temperature Rise	°C	

**14. Type Test Requirements**

14.1 The bidder shall submit a schedule of type tests for the offered conductor and accessories with the bid. Type test reports relevant to the offered design shall be furnished for review.

14.2 The minimum type tests shall include conductor stress-strain test, creep test, temperature-sag test, tensile strength test, resistance test, galvanization related tests, vibration performance test of damper/clamp assembly, and mechanical/electrical tests on fittings including slip strength and ultimate strength.

14.3 In case valid type test reports for any item are not available or are not acceptable to the Employer, the Contractor shall carry out such tests at no additional cost before commencement of bulk supply.

## **SL. NO. 2 - OPGW SYSTEM**

---

### **1. General**

1.1 This section covers the design, engineering, manufacture, testing at works, packing, supply, transportation, insurance, delivery at site, unloading, handling, storage, erection, stringing, sagging, tensioning, clipping, jointing, earthing, bonding, testing and commissioning of Optical Power Ground Wire complete with all fittings, accessories, hardware and consumables required for successful installation on the 132kV lines covered under the project.

1.2 The OPGW shall serve the dual purpose of shielding the line against lightning and providing a reliable optical fibre communication path for line differential protection, SCADA, synchronizing and other utility communication requirements associated with the ring system.

1.3 The Contractor shall be fully responsible for the complete OPGW package including survey of the existing line, verification of suitability of existing towers and peak loading on structures, stringing plan, sag-tension calculations, shutdown planning, integration with terminal equipment, and all related installation and commissioning activities.

1.4 The OPGW system shall be suitable for continuous service on 132kV overhead transmission lines in the humid, hilly and high rainfall conditions prevailing in Mizoram and shall withstand mechanical loads, electrical faults, vibration, wind, corrosion, handling stresses and service conditions envisaged under the contract.

1.5 All items, fittings and accessories not specifically mentioned but necessary for complete and satisfactory performance of the OPGW system shall be deemed to be included in the Contractor's scope without any extra cost to the Employer.

### **2. Applicable Standards**

2.1 Unless otherwise specified, the OPGW, optical fibres, hardware fittings and testing requirements shall conform to the latest editions, including all amendments up to the date of bid opening, of relevant IEC, ITU-T, IEEE, ASTM and IS standards.

2.2 The principal standards shall include, as applicable, IEC 60793 for optical fibres, IEC 60794 for optical fibre cables, IEC 61284 for overhead line fittings and mechanical tests, IEEE 1138 for OPGW, ITU-T G.652D for single mode fibre characteristics, and other internationally accepted standards applicable to the offered design.

2.3 In the event of any conflict between this specification and the standards referred to herein, the more stringent requirement shall prevail. Compliance with standards shall not relieve the Contractor of the obligation to furnish equipment and materials of proven design and reliable service.

### **3. Service Conditions and Design Basis**

3.1 The OPGW shall be designed for installation on the existing 132kV line structures included in the project and shall be suitable for the actual ruling spans, wind spans, weight spans and line deviations encountered along the route.

3.2 The OPGW shall be suitable for installation on 132 kV transmission line towers and shall function both as earth wire and as optical communication medium for teleprotection, line differential relay communication, control, SCADA and related data transmission

3.3 The offered OPGW shall be suitable for the fault current, fault duration and mechanical loading conditions applicable to the line. The bidder shall clearly declare the short circuit current carrying capacity and short circuit duration in the guaranteed technical particulars.

3.4 The optical and mechanical design shall ensure that the fibres remain protected against mechanical strain, temperature effects, vibration and handling stresses throughout the service life of the cable.

3.5 The OPGW shall be designed so that under maximum operating and fault conditions the optical fibres do not suffer unacceptable attenuation increase, mechanical damage or degradation in transmission performance.

### **4. Optical Fibre Requirements**

4.1 The OPGW shall contain not less than 48 optical fibres unless otherwise specifically approved, and the fibres shall be dual window single mode type suitable for transmission in the 1310 nm and 1550 nm windows.

4.2 The optical fibres shall conform to ITU-T G.652D requirements unless a superior and fully compatible fibre type is specifically approved. The fibre shall be suitable for high reliability utility communication use.

4.3 The mode field diameter shall be compatible with project requirements and shall generally lie within 8.6 to 9.5 micrometre at 1310 nm with allowable tolerance as per the relevant standard. Mode field concentricity error shall not exceed the specified limit for the approved fibre design.

4.4 The fibres shall be proof tested, colour coded for identification, and adequately protected by buffer tubes or equivalent fibre protection arrangement. The fibre unit shall be filled or protected to prevent ingress of moisture and to ensure long term stability.

4.5 The bidder shall guarantee fibre attenuation at 1310 nm and 1550 nm, chromatic dispersion, zero dispersion wavelength, cut-off wavelength, PMD characteristics, and all other relevant optical parameters for the offered fibre.



## **5. OPGW Construction and Mechanical Design**

5.1 The OPGW shall be of proven design comprising optical fibre unit enclosed within one or more metallic tubes and surrounded by one or more layers of metallic strands of aluminium alloy, aluminium clad steel, galvanized steel or a combination thereof, as required to meet the specified electrical and mechanical performance.

5.2 The fibre containing tube shall be of seamless metallic construction and shall provide complete protection to the optical fibres against crushing, tension, bending, torsion, vibration, thermal cycling and environmental effects during stringing and service.

5.3 The outer layer wires shall be corrosion resistant and suitable for long term outdoor service. The complete cable shall be designed to avoid galvanic incompatibility and premature corrosion under tropical and high rainfall conditions.

5.4 The OPGW shall have adequate rated tensile strength, modulus of elasticity, coefficient of thermal expansion and stress-strain characteristics to suit the line design and the stringing conditions. All such parameters shall be clearly declared in the guaranteed technical particulars.

5.5 The cable construction shall ensure that no water ingress reaches the fibre unit and that the fibres remain strain free within the design limits under all specified operating and fault conditions.

## **6. Electrical Characteristics**

6.1 The OPGW shall have adequate short circuit current carrying capacity and thermal capacity for the line on which it is to be installed. The bidder shall guarantee the short circuit current in kA and corresponding duration in seconds.

6.2 The DC resistance of the cable at 20 degree Celsius shall be clearly declared. The offered resistance and metallic cross section shall be suitable for both shielding duty and fault current dissipation.

6.3 The cable shall be capable of withstanding the temperature rise associated with the specified fault current without detrimental effect on the fibre performance, cable construction or protective finish.

6.4 The bidder shall furnish supporting calculations or authenticated design data to establish compliance with the required electrical duty and thermal performance.

## **7. Hardware and Accessories**

7.1 The OPGW shall be supplied complete with suspension assemblies, tension assemblies, vibration dampers, earthing or bonding sets, down lead clamps, joint boxes, tower fixing brackets, armour rods, repair sleeves, mid-span joint assemblies where required, and all hardware necessary for complete installation.

7.2 Suspension and dead-end assemblies shall be specifically designed for the offered OPGW size and construction and shall not cause damage, crushing or unacceptable attenuation increase in the cable during installation or service.

7.3 Vibration dampers shall be suitable for the span lengths, cable tension and vibration characteristics of the offered OPGW. The type, number and location of dampers shall be established by design and submitted for approval.

7.4 Down lead clamps and bonding arrangements shall securely route the OPGW from tower peak to joint box or terminal point without imposing excessive bending stress. The minimum bending radius specified by the manufacturer shall be maintained throughout.

7.5 All hardware shall be hot dip galvanized or otherwise suitably protected against corrosion and shall be designed for long service life in severe outdoor environment.

## **8. Manufacturing and Workmanship**

8.1 The OPGW shall be manufactured under a documented quality assurance programme and under controlled conditions ensuring uniformity of construction and compliance with guaranteed parameters.

8.2 The cable surface shall be smooth, clean and free from defects such as splits, burrs, scratches, loose wires, corrosion marks, manufacturing seams and other imperfections likely to impair performance.

8.3 All optical fibres incorporated in a given cable drum shall be factory tested for attenuation and continuity and the test results shall be furnished drum-wise.

8.4 Each drum shall be marked with drum number, cable length, type designation, fibre count, gross weight, net weight, manufacturing date, rolling direction and other relevant details required for erection control.

## **9. Installation and Stringing Requirements**

9.1 The Contractor shall prepare detailed stringing procedures, tension charts, sag charts, installation methodology, shutdown programme and safety plan for approval before commencement of field work.

9.2 Stringing shall be carried out using suitable tension stringing equipment and methods that prevent twist, abrasion, crushing, over-tensioning and damage to the OPGW or existing structures.

9.3 The Contractor shall ensure that the minimum bending radius, maximum pulling tension and all handling limitations recommended by the manufacturer are strictly observed during transportation, handling and installation.

9.4 Jointing and termination activities shall be carried out by trained personnel using approved tools and procedures. All splices shall be protected and housed in weatherproof joint boxes of approved design.

9.5 After installation, the OPGW shall be properly clipped, damped, bonded, earthed and dressed to ensure safe operation and neat workmanship throughout the line route.

## **10. Performance Requirements**

10.1 The installed OPGW system shall provide a continuous, low loss and reliable optical communication path over the full route and shall remain stable under normal service, fault conditions and environmental loading.

10.2 Fibre attenuation after manufacture and after installation shall remain within the guaranteed limits. Any abnormal increase in attenuation due to poor design, poor handling or poor workmanship shall be rectified by the Contractor at no extra cost.

10.3 The OPGW shall exhibit satisfactory vibration performance, mechanical stability, corrosion resistance and optical performance throughout its service life.

10.4 The Contractor shall guarantee the complete end-to-end fibre performance, including attenuation, continuity, identification and integrity of all fibres in the installed system.

## **11. Inspection, Testing and Commissioning**

11.1 The Employer or its representative shall have free access to the manufacturer's works during manufacture and testing of the OPGW and associated fittings.

11.2 Routine tests, sample tests and acceptance tests shall be carried out on the OPGW and accessories in accordance with applicable standards and this specification. No material shall be dispatched without satisfactory completion of the prescribed tests.

11.3 At site, the Contractor shall carry out drum testing, continuity checks, OTDR testing from both ends, attenuation measurement, splice loss verification, route inspection and complete commissioning tests for all installed fibres.

11.4 The OPGW system shall be taken over only after successful installation, testing, documentation and demonstration of satisfactory performance to the Employer.

## **12. Type Tests and Test Certificates**

12.1 The bidder shall submit valid type test reports for the offered OPGW design from reputed independent laboratories or from manufacturer's accredited laboratories, covering the principal optical, electrical and mechanical characteristics.

12.2 Type tests shall include, as applicable, tensile test, crush test, impact test, bend test, torsion test, vibration or aeolian vibration related test, temperature cycling test, short circuit test, lightning impulse or electrical performance related tests where relevant, fibre attenuation and transmission tests, and water penetration related tests.

12.3 In case the offered design differs materially from the type tested design, the Employer may require fresh type tests or supplementary evidence at no extra cost to the Employer.

12.4 Routine and acceptance test certificates for each lot or drum shall be furnished along with supply documents.

### **13. Documents to be Submitted**

13.1 Along with the bid, the bidder shall submit descriptive literature, completed GTP, dimensional and constructional details, optical fibre data sheets, hardware details, compliance statement against this specification, and type test reports.

13.2 After award, the Contractor shall submit detailed drawings, sag-tension calculations, stringing charts, hardware placement details, drum schedules, fibre allocation details, installation procedures, inspection and test plans, and commissioning documents for approval.

13.3 After completion, the Contractor shall submit as-built drawings, route records, splice schedules, OTDR traces, attenuation test results, drum reconciliation statements and all final commissioning records.

### **14. Guaranteed Technical Particulars**

The bidder shall furnish the following Guaranteed Technical Particulars for the offered OPGW system.

<b>Sl. No.</b>	<b>Description</b>	<b>Bidder's Guaranteed Particulars</b>
1	Manufacturer and country of origin	
2	OPGW type and designation	
3	Applicable standard	
4	Number of optical fibres	
5	Type of optical fibre	
6	ITU-T fibre standard	
7	Mode field diameter at 1310 nm	
8	Fibre attenuation at 1310 nm	
9	Fibre attenuation at 1550 nm	
10	Cable construction details	
11	Outer diameter of OPGW	
12	Approximate mass per kilometre	
13	Rated tensile strength	
14	Modulus of elasticity	
15	Coefficient of thermal expansion	
16	DC resistance at 20 degree Celsius	
17	Short circuit current carrying capacity	

Sl. No.	Description	Bidder's Guaranteed Particulars
18	Short circuit duration	
19	Maximum permissible installation tension	
20	Minimum bending radius during installation	
21	Minimum bending radius after installation	
22	Number and type of buffer or fibre tubes	
23	Water blocking method	
24	Type of metallic strands	
25	Vibration damper type	
26	Suspension assembly details	
27	Dead-end assembly details	
28	Joint box make and type	
29	Guaranteed splice loss	
30	Guaranteed connector loss where applicable	
31	Drum length offered	
32	Type test reports enclosed	

### **SL. NO. 3 - OPGW TERMINAL EQUIPMENT AND COMMUNICATION SYSTEM**

#### **1. General**

**1.1** The OPGW terminal equipment and communication system shall be complete in all respects and shall include all active and passive equipment, accessories, hardware, software, terminals, optical distribution arrangements, interconnection arrangements, mounting accessories, power supply interfaces, and all other items required for reliable operation of the communication path over the OPGW network.

**1.2** The equipment shall be suitable for carrying protection signals, differential protection communication, SCADA data, alarm and event data, voice/data channels wherever specified, and any other utility telecommunication requirement necessary for the intended ring system operation.

**1.3** The entire communication system offered by the Contractor shall be fully compatible with the OPGW fibre specified under the project, the differential protection relays, the synchronizing and SCADA system, and the existing or proposed substation communication architecture.

**1.4** The system design shall be such that the complete end-to-end communication channel is made available by the Contractor and no essential component required for successful commissioning shall be excluded on the ground that it is not specifically mentioned elsewhere.

## **2. Applicable Standards**

**2.1** Unless otherwise specified, the equipment shall conform to the latest editions, including amendments up to the date of bid opening, of IEC 60793, IEC 60794, IEC 60834, IEC 61000, IEC 61850, IEC 60255, ITU-T G.652D, ITU-T G.655 where applicable, and relevant IEEE/ETSI standards for telecommunication equipment.

**2.2** Where a particular standard is not available, the equipment shall comply with other internationally accepted standards equivalent or superior to the standards stated above. In case of conflict, the more stringent requirement shall govern.

## **3. Fibre Compatibility**

**3.1** All terminal equipment shall be suitable for operation with single mode optical fibres of the type provided in the project OPGW and shall be fully compatible with 48 fibre dual window single mode fibre optic cable.

**3.2** The fibre interface design shall match the optical characteristics of the specified fibre and the equipment shall be suitable for the mode field diameter and concentricity requirements stipulated for the OPGW fibre.

**3.3** The system shall be designed so that the total link attenuation, connector loss, splice loss and equipment margin remain within the guaranteed optical power budget under normal and emergency operating conditions.

## **4. ADSS Cable**

**4.1** The ADSS cable shall contain 48 optical fibres and shall employ dual window single mode fibres conforming to ITU-T G.652D. The cable construction shall be suitable for outdoor installation between line termination points and substation control room or telecom room locations as required by the approved routing.

**4.2** The cable shall be all dielectric, non-metallic and fully suitable for installation in high electrical stress environments in and around 132kV switchyards. The outer sheath shall be UV resistant, moisture resistant, rodent resistant and fungus resistant.

The minimum short term and long term tensile loading capability, allowable sag, span suitability, crush resistance and impact resistance shall be demonstrated by the

manufacturer and shall be adequate for the installation conditions envisaged in the project.

## **5. Fibre Optic Distribution Box (FODB)**

**5.1** The Fibre Optic Distribution Box shall be of robust construction suitable for indoor use in substation control room environment and shall be either 19-inch rack mountable type or wall mountable type as required by the approved layout.

**5.2** Each FODB shall have adequate termination and patching capacity for the fibres assigned under the project and, unless otherwise approved, shall be suitable for minimum 48 fibre termination with provision for future expansion.

**5.3** The enclosure shall provide proper routing, anchoring, clamping and bend radius control for incoming and outgoing fibres. Fibre routing inside the box shall be neat, accessible and adequately protected against accidental damage during maintenance.

**5.4** The FODB shall be provided with modular splice trays with identification arrangement for each fibre. Each splice tray shall be of hinged or removable type to facilitate maintenance without disturbing adjacent fibres.

**5.5** The connectors shall be of utility grade, low loss and high return loss type. SC/APC connectors shall be preferred unless a different connector type is specifically approved for compatibility with the communication equipment.

**5.6** The enclosure shall be corrosion resistant, vermin resistant and provided with locking arrangement. The protection class of the indoor distribution box shall not be less than IP-55.

## **6. Optical Fibre Joint Box (OFJB)**

**6.1** The Optical Fibre Joint Box shall be suitable for outdoor application, tower mounting or structure mounting, as applicable, and shall be weatherproof, dustproof and moisture proof with a minimum protection class of IP-68.

**6.2** The joint box shall be designed for straight jointing, mid-span jointing and looping requirements as may arise in the line routing and termination arrangements.

**6.3** The joint box housing shall be made of non-corrosive metallic or equivalent proven material suitable for tropical outdoor conditions and shall be resistant to ultraviolet radiation, rain, humidity, fungus and corrosion.

**6.4** Cable entry points shall be effectively sealed and the complete jointing arrangement shall prevent ingress of water, insects and rodents throughout the service life of the equipment.

**6.5** The joint box shall have adequate splice capacity and fibre management arrangement for the number of fibres to be terminated or looped, with suitable spare capacity for maintenance and future use.

## **7. Patch Cords, Pigtails and Accessories**

**7.1** Patch cords and pigtails shall be single mode type, fully matching the optical fibre characteristics of the OPGW system and compatible with the equipment side connectors and the FODB side connectors.

**7.2** The connector ferrules shall be of ceramic type and the termination workmanship shall ensure low insertion loss, high return loss and long-term stability.

**7.3** All accessories such as splice protectors, adapter plates, cable glands, clamps, tie elements, marker tags, mounting brackets and earthing accessories required for complete installation shall be supplied by the Contractor.

## **8. Communication Equipment**

**8.1** The communication equipment to be connected over the OPGW system shall be utility grade, microprocessor based, modular and expandable, and shall be suitable for continuous unattended operation in substation environment.

**8.2** The communication equipment shall support the transmission requirements of line differential protection and shall therefore be of low latency, high availability and deterministic performance suitable for protection signalling.

**8.3** The communication equipment shall support the required interfaces for protection relays, SCADA gateway, engineering access and other approved interfaces. The bidder shall clearly identify all electrical, optical and protocol interfaces in the guaranteed technical particulars.

**8.4** Where multiplexing equipment is offered, it shall provide the necessary ports for protection channels and network management, and shall support redundancy features required for dependable utility application.

**8.5** The equipment shall be suitable for mounting in standard relay or communication panels, racks or cabinets and shall be supplied with all mounting hardware, termination accessories and marshalling arrangement.

## **9. Functional Requirements**

**9.1** The communication system shall provide reliable end-to-end communication between the associated substations forming part of the 132kV ring system and shall support high speed exchange of signals for differential protection.

**9.2** The contractor shall ensure that the communication path provided is fully suitable for the intended protection scheme, including required channel availability, channel symmetry, latency and interface compatibility.

**9.3** The communication system shall also support supervisory functions such as alarms, equipment health indication, event reporting, communication status and diagnostics.



**9.4** Dedicated communication channels required for protection shall not be adversely affected by non-protection traffic. The system architecture shall therefore maintain the integrity and priority of protection communication.

## **10. Power Supply and Environmental Requirements**

**10.1** All active communication equipment shall be suitable for operation on the station DC supply of 48 V DC, unless otherwise specified, and shall be capable of withstanding the normal variation and disturbances associated with utility DC systems.

**10.2** The equipment shall be provided with adequate protection against overvoltage, reverse polarity, electrical surges and electromagnetic disturbances.

**10.3** The equipment shall be suitable for satisfactory operation under ambient temperature from minus 10 degree Celsius to plus 55 degree Celsius and relative humidity up to 95 percent, non-condensing, and shall be tropicalised for installation in Mizoram conditions.

## **11. Performance Requirements**

**11.1** The maximum insertion loss of connectors, pigtails and patching accessories shall be clearly guaranteed by the bidder. Typical connector insertion loss shall not exceed 0.30 dB per connector pair.

**11.2** Typical splice loss under field conditions shall be low and consistent, and for design purposes the bidder shall consider splice loss not exceeding 0.10 dB per fusion splice unless more stringent values are guaranteed.

**11.3** Return loss of optical connectors shall be suitable for single mode utility communication service and, for SC/APC connectors, shall generally not be less than 60 dB.

**11.4** The contractor shall guarantee the complete optical power budget, end-to-end attenuation and communication performance for the final installed system.

## **12. Installation, Testing and Commissioning**

**12.1** The Contractor shall carry out complete installation, termination, splicing, labelling, routing, dressing, testing and commissioning of the OPGW terminal equipment and communication system.

**12.2** The Contractor shall perform OTDR testing from both ends, insertion loss testing, continuity testing, end-to-end channel testing, port verification, alarm verification, and complete functional testing with the connected protection and control equipment.

**12.3** The Contractor shall submit route diagrams, termination diagrams, fibre allocation charts, splice schedules, as-built drawings, test reports, and end-to-end channel configuration details before taking over.

**12.4** The Contractor shall commission the system only after demonstrating successful communication between all required end points and successful integration with the protection and supervisory systems.

### **13. Guaranteed Technical Particulars**

The bidder shall furnish the following Guaranteed Technical Particulars for the offered OPGW terminal equipment and communication system.

<b>Sl. No.</b>	<b>Guaranteed Technical Particulars</b>	<b>Bidder's Offered Value</b>
1	Type of FODB offered	
2	Mounting arrangement of FODB	
3	Indoor protection class of FODB	
4	Fibre termination capacity per FODB	
5	Maximum number of fibres per splice tray	
6	Type of optical connector	
7	Guaranteed insertion loss of connector pair (dB)	
8	Guaranteed return loss (dB)	
9	Type of OFJB offered	
10	Outdoor protection class of OFJB	
11	Maximum splice capacity of OFJB	
12	Suitability for straight joint / loop / mid-span joint	
13	Type of communication equipment offered	
14	Communication interfaces provided	
15	Suitability for differential protection channel	
16	Auxiliary supply voltage	
17	Guaranteed operating temperature range	
18	Humidity withstand capability	
19	OTDR/insertion loss test facility considered	
20	Details of redundancy features, if any	

### **14. Documents to be Submitted**

**14.1** Along with the bid, the bidder shall submit descriptive literature, technical data sheets, completed GTP, compliance statement against this specification, and list of recommended spares and accessories.

**14.2** After award, the Contractor shall submit drawings, bill of materials, wiring/interconnection details, fibre allocation details, panel or rack layouts, installation procedures, test procedures, and commissioning documents for approval.

## **SL. NO. 4 - LINE DIFFERENTIAL PROTECTION SYSTEM**

---

### **1. General**

1.1 The line differential protection system shall comprise all numerical line differential relays, interface devices, communication accessories, auxiliary relays, test blocks, wiring, terminals, disturbance recording facilities, software, engineering, integration, testing and commissioning required for dependable protection of the 132kV ring system lines covered under the project.

1.2 The Contractor shall be responsible for complete design, manufacture, supply, installation, configuration, interfacing, testing and commissioning of a fully operational line differential protection scheme at all specified substations, including compatibility with the OPGW communication system and existing substation protection and control panels.

1.3 The protection scheme shall be suitable for high speed clearing of all types of line faults on the protected 132kV lines and shall remain stable for through faults, power swings, load encroachment and external disturbances.

1.4 The relays shall be of proven design, numerical, microprocessor based, draw-out type and specifically designed for transmission line main protection service in utility substations.

### **2. Applicable Standards**

2.1 Unless otherwise specified, the protection equipment and associated panels shall conform to the latest editions of IEC 60255, IEC 61850, IEC 61000, IEC 60529, IEC 60834, IS/IEC standards for protective relays, disturbance recorders and communication interfaces, and relevant utility practices for 132kV transmission systems.

2.2 In case of conflict between this specification and the referenced standards, the more stringent requirement shall apply.

### **3. Scope of Protection Scheme**

3.1 The line differential protection scheme shall be provided for each line section identified in the project and shall include terminals at the concerned substations such

as Khawiva, Kawmzawl, Zuangtui Old and Luangmual, or at such locations as indicated in the final approved drawings.

3.2 Each protected line bay shall be equipped with two independent main protection channels where required by the approved protection philosophy, along with backup protection, tripping logic, interlocking logic, event recording and fault recording features.

3.3 The scheme shall be suitable for direct fibre based communication over the project OPGW network and shall include all optical interfaces, transceivers, connectors, patch cords and accessories necessary for end-to-end operation.

#### **4. Functional Requirements**

4.1 The main protection shall operate on the unit protection principle using differential current comparison between line terminals. The relay shall provide absolute selectivity and shall trip only for faults within the protected zone.

4.2 The operating time for internal faults shall be fast enough to ensure high speed fault clearance and system stability. The relay shall support single-pole and three-pole tripping logic as required by the approved scheme.

4.3 The relay shall provide reliable operation for single phase to earth, phase to phase, double phase to earth and three phase faults and shall have facilities for weak end infeed logic, current reversal supervision and permissive/blocking logic wherever applicable.

4.4 The scheme shall remain stable during through faults, CT saturation, charging current, switching surges and external system disturbances. Suitable adaptive restraint and bias characteristics shall be incorporated.

4.5 The relay shall have built-in backup protection functions including distance protection or directional/non-directional overcurrent and earth fault protection, breaker failure initiation, dead line charging features and auto-reclose interface where required by the approved protection coordination study.

#### **5. Relay Hardware and Construction**

5.1 The relays shall be suitable for flush mounting in indoor panels and shall be of modular construction with self-supervision and continuous health monitoring.

5.2 The equipment shall operate on 110V DC auxiliary supply as available in the substation and shall withstand normal station battery voltage variation without mal-operation.

5.3 Each relay shall have adequate binary inputs, binary outputs, programmable LEDs, trip contacts, alarm contacts, communication ports and test facilities for the intended application with at least 20% spare capacity.

5.4 The front HMI shall include a display, keypad, local/remote setting access, fault indication and interrogation facilities. Relay settings shall be password protected and support role-based access.

5.5 The relay shall provide self-diagnostics for hardware, software, memory, communication channel, I/O circuits and measurement circuits, with alarm generation in the event of abnormality.

## **6. Communication and Interface Requirements**

6.1 The line differential relay shall communicate over optical fibre using direct fibre interface or suitable communication equipment designed for permissive and differential protection applications. The communication medium shall be fully compatible with the project OPGW system.

6.2 The communication interface shall support deterministic and secure exchange of synchronization and differential data with very low channel delay and high immunity to electromagnetic interference.

6.3 The Contractor shall ensure end-to-end integration of the relay with OPGW terminal equipment, fibre distribution boxes, patch panels and associated transmission equipment. No separate item shall be payable for accessories required for proper operation.

6.4 The relay shall support IEC 61850 station bus communication for SCADA and SAS integration. Additional protocols such as IEC 60870-5-103 or Modbus may be provided where required for compatibility with existing systems.

## **7. Measurement, Recording and Disturbance Analysis**

7.1 The relay shall provide metering of phase currents, earth current, voltage inputs where used, active and reactive power, frequency and other diagnostic quantities relevant to the protection function.

7.2 The relay shall store sequence of events records with time tagging accuracy better than 1 ms when synchronized from the station time source.

7.3 The relay shall include disturbance recording and fault recording facilities capable of storing oscillographic records for multiple faults. Records shall be retrievable locally and remotely in standard COMTRADE format.

7.4 The relay shall retain all settings, event logs and records in non-volatile memory during interruption of auxiliary supply.

## **8. Panels, Wiring and Accessories**

8.1 The Contractor shall provide protection panels, marshalling accessories, terminal blocks, test terminal blocks, mimic diagrams, labels, ferrules, space heaters, lighting sockets, MCBs, annunciation interface and all internal wiring necessary for the complete scheme.

8.2 Panels shall be fabricated from sheet steel, vermin proof, dust protected and suitable for indoor tropical service. The degree of protection shall be at least IP-42 for indoor panels.

8.3 All wiring shall be copper, flame retardant, stranded and neatly dressed. CT circuits, trip circuits, alarm circuits and communication circuits shall be suitably segregated.

8.4 Spare terminals of not less than 20% for each type shall be provided. Panel drawings, terminal plans, cable schedules and interconnection diagrams shall be submitted for approval before manufacture.

## **9. Environmental and EMC Requirements**

9.1 The relays and associated equipment shall be suitable for ambient temperature from 0 degree Celsius to 55 degree Celsius, relative humidity up to 95%, and severe tropical environmental conditions prevailing in Mizoram.

9.2 The equipment shall comply with IEC 61000 requirements for EMC immunity and emission and shall be suitable for installation in EHV switchyard environments without mal-operation.

## **10. Testing and Commissioning**

10.1 All relays and panels shall be subjected to routine tests at works including functional tests, insulation tests, calibration tests, self-supervision checks and communication tests.

10.2 Type test reports from NABL accredited, CPRI, ERDA, or other internationally recognised independent laboratories shall be furnished for similar relay models covering insulation, fast transient, surge immunity, vibration, climatic, high frequency disturbance, electrostatic discharge and protection performance tests.

10.3 Site tests shall include point-to-point wiring checks, CT polarity verification, secondary injection, end-to-end relay testing, channel delay verification, tripping tests, alarm tests, event retrieval, disturbance record retrieval and SCADA/SAS integration tests.

10.4 The line shall be declared commissioned only after successful completion of end-to-end differential protection testing under actual communication conditions and approval by the Engineer-in-Charge.

## **11. Drawings, Manuals and Spares**

11.1 The Contractor shall furnish detailed drawings, setting calculations, logic diagrams, configuration files, relay manuals, software licences, communication architecture drawings and operation and maintenance manuals.

11.2 Recommended commissioning spares and mandatory maintenance spares for at least five years of operation shall be furnished separately. Special tools, test plugs,

configuration cables and licensed software required for maintenance shall form part of the scope.

## 12. Guaranteed Technical Particulars (GTP)

The bidder shall furnish the following guaranteed technical particulars for the offered line differential protection system. Values furnished by the bidder shall be binding and shall form part of the contract.

Sl. No.	Parameter	Requirement
1	Relay type	Numerical, microprocessor based line differential protection relay
2	Application	132kV transmission line main protection
3	Main protection principle	Current differential/unit protection
4	Backup protection	Distance and/or overcurrent-earth fault as applicable
5	Auxiliary supply	Suitable for substation DC supply
6	Communication medium	Optical fibre over OPGW / direct fibre
7	No. of binary inputs	Bidder to specify
8	No. of binary outputs	Bidder to specify
9	Communication ports	IEC 61850 and other ports as offered
10	Self supervision	Provided
11	Event recording	Provided
12	Disturbance recording	Provided, COMTRADE compatible
13	Time synchronization	IRIG-B / SNTP / PTP compatible, bidder to specify
14	Operating time for internal fault	Bidder to specify
15	Stability for external faults and CT saturation	Shall be ensured
16	Display and local HMI	Provided
17	IP protection of relay front	Bidder to specify
18	Operating ambient temperature	Suitable for 0°C to 55°C
19	EMC compliance	As per IEC 61000
20	Type test reports	To be furnished

## **SL. NO. 5 - SYNCHRONIZATION AND SCADA VISIBILITY SYSTEM**

---

### **1. General**

1.1 The synchronization and SCADA visibility system shall comprise all hardware, software, panels, relays, synchronizing devices, RTU or gateway equipment, communication interfaces, wiring, terminals, configuration tools, accessories, licenses, and all other materials necessary for complete and successful operation of the 132kV ring system.

1.2 The Contractor shall be responsible for providing a fully integrated system suitable for safe synchronization, real-time monitoring, supervisory control, event recording, alarm annunciation, and disturbance visibility for the substations covered under the project.

1.3 The offered system shall be compatible with the protection system, OPGW communication network, battery and charger system, existing substation equipment, and any approved station control architecture at site.

1.4 The system design shall ensure dependable operation under normal, emergency, and restoration conditions and shall not require any additional essential item to be supplied by the Employer for successful commissioning.

### **2. Applicable Standards**

2.1 Unless otherwise specified, the synchronization and SCADA system shall conform to the latest editions, including amendments up to the date of bid opening, of IEC 60255, IEC 60870-5-101, IEC 60870-5-104, IEC 61850, IEC 61000, IEC 60529, IEC 62351, IEEE C37 series where applicable, and other internationally accepted standards governing substation automation and synchronization systems.

2.2 In case of conflict between the standards and this specification, the more stringent requirement shall govern. Equipment conforming to equivalent or superior standards may be accepted only after specific approval by the Employer.

### **3. Functional Requirement of Synchronization Scheme**

3.1 The synchronization system shall be suitable for synchronization of bus to bus, line to bus, and any other operational combination required for energization and ring closing under the approved system configuration.

3.2 The synchronization equipment shall continuously measure and compare voltage magnitude, frequency, phase angle, and phase sequence on both sides of the associated circuit breaker.



3.3 Breaker closing permission shall be issued only when all synchronization parameters are within the preset acceptable limits approved during detailed engineering.

3.4 The synchronization philosophy shall include permissive logic, blocking logic, breaker close supervision, failure alarm, and provision for manual supervision where required by the operating practice of the Department.

#### **4. Auto Synchronizer**

4.1 The auto synchronizer shall be of numerical, microprocessor-based type and shall be specifically designed for utility substation application.

4.2 The equipment shall have configurable operating bands for voltage difference, frequency difference, phase angle difference, dead line or dead bus condition, and live bus checking.

4.3 Unless otherwise approved, the synchronizing relay or device shall be capable of operating with voltage difference up to 10 percent, frequency difference up to 0.2 Hz, and phase angle difference up to 10 degrees, with user-configurable settings.

4.4 The auto synchronizer shall provide visual indication of permissive, blocking, healthy, failed, and close command status and shall retain event records for analysis.

4.5 The device shall have self-supervision and shall generate alarm on internal fault, VT failure, measurement abnormality, loss of auxiliary supply, or any condition affecting correct operation.

#### **5. Check Synchronizing Relay**

5.1 An independent check synchronizing relay shall be provided as a mandatory safety measure to supervise circuit breaker closing.

5.2 The check synchronizing relay shall block closing unless voltage, frequency, phase angle, and phase sequence conditions are within the preset permissible range.

5.3 The relay shall be numerical type conforming to IEC 60255 and shall be suitable for continuous service in substation environment.

5.4 The operation of the check synchronizing relay shall be independent of operator judgment and shall serve as the final permissive for breaker closing in synchronized conditions.

#### **6. RTU / Gateway / SCADA Visibility Equipment**

6.1 The SCADA visibility system shall include RTU and or gateway equipment of modular and expandable architecture suitable for acquisition, processing, storage, and transmission of all required digital and analog data.

6.2 The RTU or gateway shall acquire, at minimum, circuit breaker status, isolator status, earth switch status where applicable, protection trip and alarm indications,

synchronizing permissive status, bus voltage, line current, MW, MVAR, frequency, and other approved operational parameters.

6.3 The equipment shall support remote supervisory control of approved switching elements with proper interlocking, command select before execute logic, feedback verification, and event stamping.

6.4 The SCADA visibility system shall provide seamless integration with the Department control centre or any approved station HMI and shall be fully compatible with the communication network provided under the project.

6.5 The gateway shall support protocol conversion wherever required without loss of event sequence integrity or time stamp accuracy.

## **7. Communication and Protocol Requirements**

7.1 The synchronization and SCADA system shall communicate over the OPGW-based communication network and associated terminal equipment provided under the project.

7.2 The system shall support IEC 60870-5-104 as the preferred protocol for SCADA communication. IEC 60870-5-101, IEC 61850, Modbus, or other protocols may also be required for local integration depending on approved engineering design.

7.3 Communication architecture shall be suitable for ring operation and, wherever required, shall include redundancy at communication path, network switch, CPU, power supply, or port level.

7.4 The Contractor shall guarantee that communication latency, update rate, and data integrity are suitable for intended control, monitoring, and event transmission functions.

## **8. Time Synchronization**

8.1 The system shall include provision for accurate time synchronization of all SCADA, gateway, RTU, synchronizing devices, and associated event recording equipment.

8.2 Time synchronization shall be derived from a GPS clock or an approved station time source and shall support IRIG-B, SNTP, NTP, IEEE 1588, or other approved method as required by the final system architecture.

8.3 Event time stamping accuracy at device level shall be within plus or minus 1 millisecond or better where supported by the equipment.

## **9. Human Machine Interface and Data Handling**

9.1 Where local HMI is included, it shall provide clear single line mimic display, measured values, command screen, event list, alarm summary, disturbance indications, and user access control.

9.2 The system shall have adequate memory for event and alarm storage, sequence of events recording, and retrieval of operational history for fault analysis and audit.

9.3 All engineering software, configuration files, point lists, logic diagrams, and backup files required for operation and maintenance shall be supplied by the Contractor.

## **10. Auxiliary Supply and Environmental Requirements**

10.1 The system shall be suitable for operation on 48V DC substation battery supply unless otherwise approved. Necessary DC-DC converters or internal supply modules shall be included where required.

10.2 Equipment shall be protected against reverse polarity, voltage surge, transient overvoltage, and electromagnetic interference.

10.3 All equipment shall be suitable for tropical and humid site conditions and for ambient temperature from minus 10 degree Celsius to plus 55 degree Celsius, with relative humidity up to 95 percent non-condensing.

10.4 Enclosures shall have minimum protection class IP-54 for indoor mounted equipment and higher protection wherever equipment is installed in harsher environments.

## **11. Cyber Security and Access Control**

11.1 The system shall provide user authentication, password control, configurable privilege levels, audit trail of operator actions, and logging of configuration changes.

11.2 Equipment and software shall be suitable for implementation of utility cyber security measures and shall, as far as practicable, conform to IEC 62351 or equivalent recognized security practices.

11.3 Default passwords shall not be retained at the time of commissioning and all administrative access arrangements shall be handed over in a controlled manner to the Employer.

## **12. Documentation and Spares**

12.1 The Contractor shall furnish detailed bill of materials, guaranteed technical particulars, GA drawings, wiring diagrams, terminal plans, cable schedules, communication architecture drawings, logic diagrams, software backup, operating manuals, maintenance manuals, and test certificates.

12.2 Necessary commissioning spares, special tools, software cables, and diagnostic accessories required for successful installation, testing, and maintenance shall be included in the scope of supply.

12.3 The Contractor shall also provide training to the Employer personnel for operation, testing, routine maintenance, configuration backup, and fault diagnosis of the system.

### 13. Guaranteed Technical Particulars (GTP)

Sl. No.	Guaranteed Technical Particulars	Bidder's Offered Value
1	Type and make of auto synchronizer	
2	Type and make of check synchronizing relay	
3	Rated auxiliary supply voltage	
4	Permissible voltage difference setting range	
5	Permissible frequency difference setting range	
6	Permissible phase angle difference setting range	
7	Supported synchronization applications	
8	RTU / Gateway architecture	
9	Number of digital inputs supported	
10	Number of digital outputs supported	
11	Number of analog inputs supported	
12	Supported SCADA protocols	
13	Supported local integration protocols	
14	Redundancy features provided	
15	Time synchronization method supported	
16	Event time stamp accuracy	
17	Event and alarm storage capacity	
18	Operating temperature range	
19	Relative humidity suitability	
20	Ingress protection class	
21	EMI / EMC compliance standard	
22	Cyber security features offered	
23	Factory acceptance tests proposed	
24	Site tests and integrated commissioning tests proposed	
25	Deviation, if any, from specification	Nil / Specify

*Note: The Contractor shall furnish complete technical literature, catalogues, data sheets, protocol details, logic description, and all relevant test certificates in support of the offered synchronization and SCADA visibility system.*

## **SL No. 6 CARRIER AIDED PROTECTION SYSTEM**

### **(DIGITAL TELEPROTECTION COUPLER / DTPC WITH SDH INTERFACE)**

This section covers the design, engineering, manufacture, supply, installation, testing and commissioning of complete carrier aided protection system for the 132kV line protection scheme, including SDH communication interface, digital teleprotection terminal equipment, E1/fibre optic converter, telecom cabinet, interconnection accessories, supervision, diagnostics, and all works necessary for successful operation.

#### **1.0 SCOPE**

The system shall be suitable for transfer of protection commands between terminal substations over the optical communication network associated with the OPGW system and shall be fully coordinated with the line differential and associated backup protection scheme.

The scope shall include teleprotection terminal equipment, SDH communication interface, E1/fibre optic converter, telecom cabinet, mounting hardware, interconnecting cables, configuration software, supervision and alarms, routine tests, type test evidence, site testing, integration and commissioning.

#### **2.0 APPLICABLE STANDARDS**

The equipment and accessories shall conform to the latest editions of IEC 60255, IEC 60834, IEC 61000, ITU-T G.703, ITU-T G.704, ITU-T G.823, IEC 61850 for interface compatibility where applicable, and all other relevant standards for teleprotection and substation communication systems.

In case of conflict between this specification and the referenced standards, the requirement that is more stringent from the point of view of reliability and performance shall prevail.

#### **3.0 SDH COMMUNICATION INTERFACE**

The teleprotection equipment shall be suitable for operation over an SDH based optical communication network. The SDH side interface shall support reliable, secure and low latency transmission of protection commands and supervision signals.

The equipment shall support at least one E1 interface of 2.048 Mbps, 120 ohms balanced, for integration with SDH multiplex equipment. It shall be suitable for connection through the optical communication system associated with the OPGW network using single mode fibre.

The protection signalling channel shall be dedicated for protection duty and shall not be adversely affected by routine SCADA or non-protection traffic. Continuous supervision of the communication channel shall be provided, and any channel failure, abnormal delay, or signal degradation shall generate alarm and event indication.

The arrangement shall be suitable for transmission of direct transfer trip, permissive trip, blocking and intertrip commands as required by the protection philosophy. End-to-end delay shall be low enough to ensure proper operation of the associated protection scheme.

#### **4.0 DIGITAL TELEPROTECTION TERMINAL EQUIPMENT**

The teleprotection terminal equipment shall be digital, numerical, microprocessor based and 19-inch rack mountable. It shall be of proven design intended specifically for utility protection signalling application.

The equipment shall provide minimum eight independent protection command channels, with two-way simultaneous command transmission capability. The bidder shall clearly state the available channels, allocation philosophy and expandability.

The equipment shall provide suitable binary inputs and outputs for interfacing with numerical relays and associated annunciation or supervision circuits. Output contacts shall be potential free and suitable for the control voltages specified in this tender.

The equipment shall have local indication for healthy condition, command transmitted, command received, alarm, power supply status and communication channel status.

#### **5.0 PERFORMANCE REQUIREMENTS**

The operating time of the teleprotection equipment shall be suitable for high speed protection application and the end-to-end command transfer time under normal conditions should preferably not exceed 10 milliseconds, excluding relay operating time.

The bit error rate of the communication channel handling teleprotection commands shall be  $10^{-9}$  or better. The overall availability of the teleprotection channel shall be not less than 99.9 percent.

The equipment shall be immune to noise, switching surges, electromagnetic interference and substation disturbances within the applicable standard limits.

#### **6.0 COMMAND VOLTAGE AND INTERFACES**

The teleprotection system shall be suitable for command voltages of 110V DC/48V DC and shall be supplied complete with all required interface modules for the specified application.

The communication interfaces shall include at least one E1 electrical interface, configuration/engineering port, maintenance port and Ethernet port for local or remote supervision. The bidder shall indicate all provided ports in the GTP.

#### **7.0 POWER SUPPLY**

The equipment shall be suitable for redundant 48V DC auxiliary power supply and shall be provided with two independent 48V DC inputs with automatic failover.

Appropriate protection against reverse polarity, transient overvoltage and supply disturbances shall be provided. Failure of one DC input shall not interrupt the teleprotection service.

## **8.0 MANAGEMENT, MONITORING AND DIAGNOSTICS**

The system shall support local and remote monitoring through graphical user interface and suitable communication/management ports such as Ethernet, serial or USB as applicable. It shall support event logging, alarm recording, diagnostics and configuration security.

SNMP or equivalent supervisory interface shall be provided for integration with utility telecom or substation monitoring system. The equipment shall also provide facility for retrieval of disturbance and event records for diagnostic purposes.

One external trip counter display, wherever specified in the DPR/estimate, shall be supplied as part of the system.

## **9.0 E1 / FIBRE OPTIC CONVERTER**

The E1 / fibre optic converter shall be suitable for conversion of E1 electrical signal to optical signal and vice versa for integration with the optical communication system.

It shall be compatible with the specified single mode optical fibre, suitable for utility grade service, and complete with required optical ports, electrical ports, mounting hardware and patch accessories.

The converter shall have low latency, adequate optical budget and clear visual indication for power, transmit, receive and alarm status.

## **10.0 TELECOM CABINET**

The teleprotection equipment, converter and associated accessories shall be mounted in an indoor, floor mounted, 19-inch telecom cabinet of minimum protection IP41. The indicative size shall be approximately 1800 mm height x 600 mm width x 600 mm depth unless otherwise required for the offered arrangement.

The cabinet shall be robust, vermin proof, properly ventilated, powder coated, and provided with cable entry arrangement, gland plates, internal lighting if required, earthing terminal, identification labels and space for future extension.

## **11.0 ENVIRONMENTAL AND EMC REQUIREMENTS**

The equipment shall be suitable for indoor installation in tropical substation conditions and shall operate satisfactorily for ambient temperature from minus 10 degree Celsius to plus 55 degree Celsius and relative humidity up to 95 percent non-condensing.

The complete system shall comply with the applicable EMC requirements and shall be adequately tropicalised against moisture, fungus and corrosion.

## 12.0 INSTALLATION AND COMMISSIONING

The contractor shall carry out complete installation, termination, ferruling, wiring, labelling, configuration, database loading, integration and commissioning of the teleprotection system.

The contractor shall establish end-to-end healthy teleprotection channels and demonstrate successful operation with the associated relay scheme before the system is accepted.

## 13.0 GUARANTEED TECHNICAL PARTICULARS

The bidder shall furnish complete Guaranteed Technical Particulars covering all relevant parameters including make, model, country of origin, interface type, number of channels, command voltage, operating time, power supply, supervision features, standards complied with, cabinet details and test particulars.

## 14.0 PROVISIONAL BOQ ITEMS

- VCL-TP teleprotection terminal equipment, 19-inch rack mountable, with E1 interface, command channels, management ports, redundant 48V DC supply and external trip counter display.
- E1 / FO converter
- IP41 compliant 19-inch telecom cabinet, approximately 1800(H) x 600(W) x 600(D).
- SDH Multiplexer, Ethernet Card, Voice Card

## 15.0 GUARANTEED TECHNICAL PARTICULARS (TO BE FILLED BY BIDDER)

Sl. No.	Parameter	Specified Requirement	Offered by Bidder
1	Type of system	Digital teleprotection coupler suitable for carrier aided protection	
2	Mounting	19-inch rack mountable	
3	Communication network compatibility	Suitable for SDH based optical communication network	
4	Interface type	Minimum 1 x E1, 2.048 Mbps, 120 ohms balanced	
5	Minimum protection channels	8 independent channels or better	
6	Command transmission mode	Two-way simultaneous binary command transfer	
7	Supported protection schemes	Direct trip / permissive / blocking as applicable	
8	Command voltage compatibility	110V DC/48V DC	
9	Auxiliary power supply	48V DC	
10	Operating time	Suitable for high speed protection; preferably <= 10 ms end-to-end	
11	Supervision and alarms	Continuous channel supervision with alarms and event logging	



12	Management ports	Ethernet / serial / USB or equivalent	
13	External trip counter display	To be provided as required	
14	E1/FO converter	Provided and compatible with offered system	
15	Telecom cabinet	Indoor, IP41, 19-inch, approx. 1800 x 600 x 600 mm	
16	Standards complied with	IEC 60255, IEC 60834, IEC 61000, ITU-T G.703/G.704 or equivalent	

## **SL. NO. 7 - 48V BATTERY BANKS AND BATTERY CHARGERS**

### **1. General**

1.1 This specification covers the design, engineering, manufacture, testing, supply, transportation, insurance, delivery, installation, commissioning and satisfactory operation of complete 48V DC battery banks, battery chargers, DC distribution arrangements, monitoring accessories and all associated equipment required for the protection, control, communication, synchronization, SCADA and annunciation systems at the substations covered under the project.

1.2 The battery bank and charger system shall be complete in all respects and shall include batteries, racks, inter-cell connectors, end-cell connectors, support structures, battery charger cubicles, incoming and outgoing feeders, DC distribution board where specified, cable boxes, selector switches, meters, alarms, monitoring relays, fuses or MCBs, labels, terminal blocks, earthing terminals and all accessories necessary for reliable station DC supply.

1.3 The system shall be suitable for continuous operation in tropical outdoor and indoor substation conditions prevailing in Mizoram and shall be capable of maintaining uninterrupted DC supply to all essential loads under normal and emergency conditions.

1.4 The battery bank and charger shall be sized on the basis of approved DC load calculation covering continuous loads, emergency loads, tripping loads, alarm loads, communication loads, relay loads and design margin. No equipment or accessory essential for successful operation shall be omitted from the Contractor's scope.

### **2. Applicable Standards**

2.1 Unless otherwise specified, the equipment shall conform to the latest editions of relevant Indian Standards and IEC standards, including IS 1651, IS 15549, IEC 60896, IEC 61427, IEC 62485, IEC 60146, IEC 61204, IEC 61000, IEC 60529 and other applicable standards governing stationary batteries, chargers and DC systems for utility substations.

2.2 In case of conflict between this specification and the referenced standards, the more stringent requirement shall prevail.

### **3. System Requirement**

3.1 The station DC system shall be of nominal 48V DC and shall be suitable for supplying protection relays, line differential equipment, synchronizing devices, SCADA or RTU equipment, indication circuits, annunciation, breaker trip and close circuits where designated, telecom accessories and other approved DC loads.

3.2 The charger shall normally feed the DC loads and simultaneously maintain the battery bank on float charge. During AC supply failure, the battery bank shall supply the connected DC loads without interruption for the required duty cycle. Upon restoration of AC supply, the charger shall recharge the battery while carrying the connected load.

3.3 The system configuration, charger rating, battery capacity in ampere-hour and feeder arrangement shall be based on the approved drawings and load schedule. The minimum autonomy and recharge requirement shall be as approved during detailed engineering and shall be adequate for station operational and protection requirements.

3.4 The Charger must be suitable for charging 100AH battery and supply of continuous load at 15A with DC output utilizing 15 nos. of 2P DC MCBs suitably rated(e.g. 6A or 10A) to ensure proper fault discrimination with the main 30A charger output, matching the specific requirements of the connected protection and communication loads. Input : 415V  $\pm$  10%, 3-Ph, 50Hz, 4Wires. Output : 48V DC / 30A (BC)

### **4. Battery Bank**

4.1 The battery bank shall be stationary, sealed maintenance free valve regulated lead acid type or other specifically approved maintenance free utility-grade type suitable for substation DC service. The battery design shall be proven in utility installations and shall be suitable for float and boost duty.

4.2 The battery bank shall consist of adequate number of cells connected in series to provide a nominal 48V DC system. The number of cells and end-of-discharge voltage shall be selected to ensure proper operation of all connected equipment throughout the discharge cycle.

4.3 The batteries shall be housed on sturdy, acid-resistant, powder-coated or otherwise corrosion-protected steel racks with adequate seismic and mechanical strength. Battery racks shall permit safe inspection, easy replacement of cells and proper ventilation around each cell.

4.4 Each battery cell shall be permanently marked with manufacturer's name, type designation, serial number, month and year of manufacture, rated capacity and polarity. Inter-cell connectors and terminal hardware shall be of suitably protected copper or other approved conductive material and shall be designed to minimize voltage drop and corrosion.

4.5 The battery shall be capable of operating satisfactorily over the specified ambient conditions without undue reduction in life. The expected service life at site conditions shall not be less than the value guaranteed by the manufacturer, and shall ordinarily be not less than 10 years for VRLA service unless otherwise approved.

4.6 The battery bank shall be designed for the duty cycle corresponding to the project DC load profile with aging factor, design margin and temperature correction. The bidder shall submit complete battery sizing calculations during detailed engineering.

## **5. Battery Charger**

5.1 The battery charger shall be static, microprocessor-controlled, solid-state type and shall be suitable for indoor substation service. The charger shall be designed for float-cum-boost charging of the associated 48V battery bank while simultaneously supplying the connected DC loads.

5.2 The charger input shall be suitable for the station AC supply available at site, normally 415V AC, 3-phase, 4-wire, 50 Hz or as specified in the approved drawings. Suitable input protection, surge suppression and phase failure protection shall be provided.

5.3 The charger output shall be adequately rated for the maximum continuous DC load plus battery charging current. The charger shall operate with automatic float and boost modes, current limiting, soft start and suitable regulation features.

5.4 The output voltage regulation under steady-state operating conditions shall be within plus or minus 1 percent and the output current regulation shall be within the guaranteed limits. Ripple content at the charger output shall be low enough to avoid adverse effects on relay, communication and SCADA equipment and shall generally not exceed 2 percent RMS unless a more stringent value is specified by the equipment manufacturer.

5.5 The charger shall be suitable for parallel operation where such arrangement is approved and shall have protection against reverse current, short circuit, overload, internal fault, overvoltage, under voltage and overheating. Necessary annunciation and alarm contacts shall be provided.

5.6 The charger shall be provided with digital metering for DC voltage and current, AC input voltage, charger healthy indication, mains fail, DC earth fault alarm, battery under-voltage, charger fail, fuse or MCB trip, common alarm and any other essential alarm for station operation.

## **6. DC Distribution and Monitoring**

6.1 A suitably rated DC distribution board or integrated outgoing feeder arrangement shall be provided with adequate number of outgoing feeders for all present and future approved loads. Each feeder shall have independent protection, labeling and terminal arrangement.

6.2 The DC system shall include means for battery current measurement, bus voltage measurement, charger current measurement and DC earth fault monitoring. A battery discharge ammeter or equivalent digital monitoring function shall be provided.

6.3 All alarm and status contacts required for transmission to SCADA, annunciation panel or RTU shall be provided as potential free contacts. The DC system shall also be compatible with any approved local HMI or remote monitoring arrangement.

## **7. Constructional Features**

7.1 Charger cubicles shall be fabricated from sheet steel of adequate thickness, sheet-metal treated against corrosion, and finished with durable powder coating suitable for tropical indoor utility service. Degree of protection shall be at least IP-42 for indoor cubicles unless a higher degree is specifically required.

7.2 Components shall be arranged for safe operation, ease of maintenance and adequate ventilation. All internal wiring shall be ferruled at both ends and all devices shall be permanently labeled. The design shall ensure sufficient creepage, clearance and segregation between AC and DC circuits.

7.3 The equipment shall be suitable for ambient temperature from 0 degree C to 55 degree C, relative humidity up to 95 percent and the polluted, humid substation environment prevailing at site.

## **8. Performance Requirements**

8.1 The complete DC system shall ensure reliable operation of all connected protection, communication and control loads under the most onerous duty cycle envisaged for the project.

8.2 The charger shall be capable of restoring the battery to a healthy state of charge within a reasonable recharge period after discharge while simultaneously supporting the connected DC loads.

8.3 The battery terminal voltage at end of discharge shall remain adequate for satisfactory performance of all connected equipment in accordance with their operating voltage limits.

## 9. Tests

9.1 Type tests, routine tests and acceptance tests shall be carried out in accordance with the relevant IS and IEC standards. Type test reports for battery and charger from a recognized laboratory shall be furnished for review.

9.2 Routine tests on battery charger shall include functional tests, insulation resistance test, high voltage test where applicable, voltage regulation test, current regulation test, ripple measurement, alarm and annunciation checks and charger protection tests.

9.3 Routine tests on batteries shall include capacity verification or manufacturer's certified production testing, visual examination, polarity check, insulation checks of accessories, connector tightness and overall inspection. Site tests shall include installation checks, float and boost operation checks, discharge verification where specified, alarm checks and integrated performance test with connected DC loads.

## 10. Drawings and Documents

10.1 The Contractor shall submit for approval general arrangement drawings, schematic diagrams, battery sizing calculations, charger sizing calculations, single line diagram of DC system, feeder schedule, terminal plan, cable schedule, bill of materials, operation and maintenance manual, test certificates and guaranteed technical particulars.

10.2 As-built drawings and commissioning reports shall be submitted after successful commissioning.

### Guaranteed Technical Particulars (GTP)

Sl. No.	Particulars	Specified Requirement	Bidder's Offer
1	System nominal voltage	48V DC	To be filled by Bidder
2	Battery type	Stationary maintenance free battery suitable for substation DC duty	To be filled by Bidder
3	Battery bank capacity	100AH	To be filled by Bidder
4	Number of cells	Suitable for 48V nominal system	To be filled by Bidder
5	Expected service life	Minimum 10 years for VRLA or as guaranteed	To be filled by Bidder
6	Charger type	Static, microprocessor-controlled float-cum-boost charger	To be filled by Bidder
7	AC input supply	Suitable for station AC supply : 415V $\pm$ 10%, 3-Ph, 50Hz, 4Wires	To be filled by Bidder
8	DC output rating	48V	To be filled by Bidder
9	Output voltage regulation	Within +/-1% or better	To be filled by Bidder

Sl. No.	Particulars	Specified Requirement	Bidder's Offer
10	Output ripple	Not more than 2% RMS	To be filled by Bidder
11	Protection features	Overvoltage, overload, short circuit, reverse current, mains fail, earth fault and common alarm	To be filled by Bidder
12	Enclosure protection	Minimum IP-42 for indoor charger cubicle	To be filled by Bidder
13	Ambient suitability	0 degree C to 55 degree C, humidity up to 95%	To be filled by Bidder
14	SCADA/RTU interface	Potential free contacts for alarms and status signals	To be filled by Bidder

## **SL. NO. 8 - CURRENT TRANSFORMERS**

1.1 This specification covers the design, engineering, manufacture, testing, supply, transportation, insurance, delivery, erection, testing and commissioning of outdoor current transformers required for the 132kV line and substation bays covered under the project.

1.2 The current transformers shall be complete in all respects and shall include all fittings, terminal connectors, terminal boxes, mounting accessories, secondary terminal arrangements, name plates, marshalling accessories, oil or insulation system accessories as applicable, earthing terminals and all other items necessary for safe and reliable operation.

1.3 The current transformers shall be suitable for replacement of existing inadequate CTs in the 132kV system and shall meet the requirements of metering, protection, indication, disturbance recording and synchronization related measurements as applicable under the approved scheme.

### **2. Applicable Standards**

2.1 Unless otherwise specified, the current transformers shall conform to the latest editions of IEC 61869 series, IS 2705, IEC 60044 where still applicable, IEC 60071, IEC 60529 and all other relevant Indian and international standards for outdoor instrument transformers used in 145kV class substations.

2.2 In case of conflict between this specification and the standards, the more stringent requirement shall apply.

### **3. Service Conditions and Rating**

3.1 The current transformers shall be suitable for installation in outdoor 132kV switchyards under the environmental conditions prevailing in Mizoram, including high humidity, heavy rainfall, and polluted atmosphere.

3.2 The current transformers shall be of 145kV class, single phase, outdoor type, suitable for solidly earthed 132kV system unless otherwise indicated in the approved drawings.

3.3 The rated frequency shall be 50 Hz. The rated insulation level shall be appropriate for 145kV class equipment and shall generally correspond to a lightning impulse withstand level of not less than 650kVp and a one-minute power frequency withstand level of not less than 275kV rms unless a higher value is required by the approved equipment schedule.

3.4 The rated continuous thermal current, short-time thermal current and dynamic current withstand capability shall be suitable for the system fault level and shall not be less than the values specified in the approved schedule. In absence of a separately specified value, the CT shall generally be suitable for not less than 31.5kA for one second with corresponding dynamic withstand current.

### **4. Constructional Requirements**

4.1 The CTs shall be of proven outdoor design suitable for utility service and shall preferably be oil-immersed, hermetically sealed, live tank type or any other specifically approved proven design suitable for 145kV AIS installation. The design offered shall have successful service experience in transmission substations.

4.2 The external insulation shall be high strength porcelain or composite polymer suitable for the site pollution level. The minimum specific creepage distance shall be suitable for the actual site conditions and shall generally not be less than 31 mm per kV of highest system voltage for humid and polluted locations, unless otherwise approved.

4.3 The CT shall be mechanically robust and capable of withstanding all electrical, thermal and mechanical stresses due to operation, transportation, short circuit and seismic or wind conditions applicable to the site.

4.4 The terminal box shall be weatherproof, vermin-proof and gasketed with at least IP-55 degree of protection. It shall contain secondary terminals, shorting and grounding facilities, labels and sufficient space for wiring and testing.

4.5 Primary terminals shall be suitable for connection to the associated 132kV equipment and conductor arrangement and shall be supplied with all necessary bimetallic or approved connectors. All external ferrous parts shall be hot-dip galvanized or otherwise suitably corrosion protected.

## **5. Core Requirement and Accuracy**

5.1 Each CT Ratio shall be 1200-600-300 and shall have 4-core for protection and metering. Separate cores shall be provided for metering, main protection, backup protection, bus bar or breaker failure logic, disturbance recording and any other specified function.

5.2 Metering core accuracy class shall be 0.2S for Core-I. Protection core accuracy shall generally be 5P for core-II and PS class for core III and IV as required by the protection scheme with rated burden of 30VA. The accuracy limit factor, instrument security factor, knee point voltage, excitation current and winding resistance shall be suitable for the intended application.

5.3 The rated burden of each core shall be adequately selected after considering connected load, lead burden and design margin. No CT core shall saturate within the operating range of the associated protection relay or measuring instrument.

5.4 Multi-ratio CTs may be provided where indicated in the approved drawings. The ratio, core allocation and terminal marking shall be clearly indicated on the nameplate and terminal diagram.

## **6. Insulation and Dielectric Requirements**

6.1 The insulation system shall be designed for long life and reliable operation under continuously energized conditions. The CT shall be free from partial discharge, internal voids, oil leakage and moisture ingress.

6.2 For oil-filled CTs, the oil shall be high-grade inhibited mineral insulating oil conforming to relevant standards. Provision shall be made for oil level indication and pressure or expansion arrangement where applicable. The design shall minimize maintenance and shall prevent deterioration of insulation due to breathing or moisture ingress.

6.3 The dielectric design shall ensure satisfactory performance under lightning impulse, switching surge, temporary overvoltage and power frequency voltage conditions applicable to the system.

## **7. Secondary Wiring and Marking**

7.1 Secondary terminals shall be brought out to a terminal box with stud-type terminals, non-corrosive hardware, ferrules, shorting links and grounding provision. The arrangement shall permit testing without disturbing permanent wiring.

7.2 Terminal marking, core identification and polarity marking shall conform to the relevant standards. The nameplate shall indicate manufacturer's name, type, serial number, year of manufacture, ratio, burden, accuracy class, output, short-time current rating, insulation level, oil quantity where applicable and other essential particulars.



7.3 A permanently fixed terminal diagram shall be provided inside the terminal box cover.

## **8. Performance Requirements**

8.1 The CT shall faithfully reproduce primary current under normal and fault conditions within the guaranteed accuracy limits for the intended metering and protection applications.

8.2 The protection cores shall remain adequately accurate during internal and external fault conditions to ensure reliable relay performance. The metering cores shall maintain their metering accuracy and security as specified.

8.3 Magnetization characteristics, knee point voltage and secondary resistance values for special protection cores shall be furnished by the bidder and shall be verified during routine testing.

## **9. Tests**

9.1 Type tests, routine tests and acceptance tests shall be carried out in accordance with IEC 61869 and IS 2705. Type test reports from an accredited laboratory for equipment of similar design and rating shall be furnished for review.

9.2 Routine tests shall include verification of terminal marking and polarity, power frequency withstand test on primary, partial discharge test where applicable, ratio test, accuracy test, excitation characteristics, knee point voltage test for special protection cores, winding resistance measurement, insulation resistance test, oil leak test for oil-filled units and overall dimensional checks.

9.3 Site tests shall include inspection after erection, insulation resistance measurement, polarity check, ratio verification, secondary wiring continuity check, grounding check and commissioning tests with associated relays and metering circuits.

## **10. Drawings and Documents**

10.1 The bidder shall furnish with the bid the guaranteed technical particulars, outline drawing, terminal arrangement, nameplate details, core data, burden calculation basis and type test details.

10.2 The Contractor shall submit after award all detailed drawings, instruction manuals, test certificates and as-built records required for approval and final documentation.

### **Guaranteed Technical Particulars (GTP)**

<b>Sl. No.</b>	<b>Particulars</b>	<b>Specified Requirement</b>	<b>Bidder's Offer</b>
1	Type of current transformer	Outdoor, single phase, 145kV class CT with ratio 1200-600-300/1-1-1-1A	To be filled by Bidder

<b>Sl. No.</b>	<b>Particulars</b>	<b>Specified Requirement</b>	<b>Bidder's Offer</b>
2	Highest system voltage	145kV class	To be filled by Bidder
3	Rated frequency	50 Hz	To be filled by Bidder
4	Insulation level	Not less than 650kVp impulse and 275kV power frequency withstand	To be filled by Bidder
5	Continuous thermal current factor	As per approved schedule and system requirement	To be filled by Bidder
6	Short-time thermal current	Suitable for system fault level, generally not less than 31.5kA for 1 second	To be filled by Bidder
7	Dynamic current withstand	Corresponding to short-time thermal current rating	To be filled by Bidder
8	Core configuration	As required for metering and protection functions	To be filled by Bidder
9	Metering core accuracy	0.2S	To be filled by Bidder
10	Protection core accuracy	5P for Core II and PS for Core III and IV	To be filled by Bidder
11	Rated burden	30VA	To be filled by Bidder
12	Insulation medium	Proven oil-filled or approved equivalent design	To be filled by Bidder
13	External insulation	Porcelain or composite, suitable for site pollution level	To be filled by Bidder
14	Terminal box protection	Minimum IP-55	To be filled by Bidder
15	Creepage distance	Suitable for humid/polluted atmosphere, generally not less than 31 mm/kV	To be filled by Bidder
16	Knee Point Voltage	as per approved protection requirement, minimum values to be declared by bidder and verified during testing.	To be filled by Bidder

### **SL. NO. 9 – Miscellaneous Tools**

1	Laptop computer for reporting Disturbance Records, etc.,- Configuration shall be equal or similar to the configuration: Processor Ryzen 5(6600H) 16GB RAM DDR5 Graphic Card RTX 4050 512GB SSD NVME
2	Fiber Splicing Machine (FUJIKURA 48s+ or equivalent) with cleaver, cutter and spare accessories
3	Optical Time Domain Reflectometer OTDR (Viavi 100ASor equivalent)
4	Fiber Splicing tools kit

5	Hydraulics ACSR Conductor Cutter
6	Hitools Automatic Clamp 6 Ton for ACSR Conductor (For HTLS)
7	Hitools Automatic Clamp 3.5 Ton for Wire Rope & Earth Wire (For OPGW)
8	1.5T Lever Ratchet Hoist
9	6T Lever Ratchet Hoist
10	Lever Ratchet Hoist Extra Chain for 1.5T
11	Lever Ratchet Hoist Extra Chain for 6T
12	Laser Source
13	Power Meter

## SECTION VI

### REFERENCE BOQ AND EPC PRICE SCHEDULE

The quantities indicated in Part A are provisional and indicative only and are included for scope definition, engineering verification, bid completeness and milestone assessment under the EPC contract. The Reference BOQ shall not be treated as a re-measurement schedule, and no claim for item-wise payment or minor quantity variation shall be entertained except as otherwise expressly provided in the Contract.

#### Part A - Reference BOQ / Scope Quantity Schedule

##### A.1 Substation-wise Summary of Major Quantities

Sl. No	Substation	HTL S Conductor (Ckt Km)	CT (No)	Line Differential Relay (No)	Laptop for tripping report (Set)	Synchronising Devices (Set)	Master Trip Autoreset Relay (No)	OPGW 48f Fiber (Km)	OPGW End Device incl ADS, FOD B, etc (Set)	DTPC with SDH (Set)	SCADA Visibility Devices (No)	DC 48V Battery Charger (No)
1	2	3	4	5	6	7	8	9	10	11	12	13
<b>1</b>	<b>Luangmual Substation</b>	<b>8.5</b>		<b>3</b>	<b>1</b>	<b>5</b>	<b>5</b>	<b>23.5</b>	<b>3</b>	<b>3</b>	<b>5</b>	<b>1</b>
a	PGCI Incoming					1	1				1	
b	Melriat			1		1	1	19	1	1	1	
c	PHE					1	1				1	
d	Zuangtui Old	8.5		1		1	1	1	1	1	1	
e	Sihhmui			1		1	1	3.5	1	1	1	
<b>2</b>	<b>Melriat Substation</b>		<b>6</b>	<b>2</b>	<b>1</b>	<b>2</b>	<b>2</b>	<b>1</b>	<b>2</b>	<b>2</b>	<b>2</b>	<b>1</b>
	Incoming		3									
a	Luangmual			1		1	1		1	1	1	
b	Khawiva		3	1		1	1	1	1	1	1	
<b>3</b>	<b>Khawiva Substation</b>		<b>6</b>	<b>2</b>	<b>1</b>	<b>2</b>	<b>2</b>		<b>2</b>	<b>2</b>	<b>2</b>	<b>1</b>
	Incoming											
a	Melriat		3	1		1	1		1	1	1	
b	Kawmzawl		3	1		1	1		1	1	1	
<b>4</b>	<b>Kawmzawl Substation</b>		<b>6</b>	<b>2</b>	<b>1</b>	<b>2</b>	<b>2</b>	<b>0.5</b>	<b>2</b>	<b>2</b>	<b>2</b>	<b>1</b>
	Incoming											
a	Khawiva		3	1		1	1		1	1	1	
b	Thenzawl		3	1		1	1	0.5	1	1	1	
<b>5</b>	<b>Thenzawl</b>		<b>6</b>	<b>2</b>	<b>1</b>	<b>2</b>	<b>2</b>		<b>2</b>	<b>2</b>	<b>2</b>	<b>1</b>

a	Incoming Bukpui		3	1		1	1		1	1	1	
b	Kawmzawl		3	1		1	1		1	1	1	
<b>6</b>	<b>Bukpui Substation</b>		<b>6</b>	<b>2</b>	<b>1</b>	<b>2</b>	<b>2</b>		<b>2</b>	<b>2</b>	<b>2</b>	<b>1</b>
a	Incoming Zuangtui		3	1		1	1		1	1	1	
b	Thenzawl		3	1		1	1		1	1	1	
<b>7</b>	<b>Zuangtui New Substation</b>		<b>6</b>	<b>2</b>	<b>1</b>	<b>3</b>	<b>3</b>		<b>2</b>	<b>2</b>	<b>3</b>	<b>1</b>
a	PGCI Incoming			1		1	1		1	1	1	
b	Zuangtui Old Sub Station		3	1		1	1				1	
c	Bukpui		3	1		1	1		1	1	1	
<b>8</b>	<b>Zuangtui Old Substation</b>	<b>0.5</b>	<b>6</b>	<b>2</b>	<b>1</b>	<b>2</b>	<b>2</b>		<b>2</b>	<b>2</b>	<b>2</b>	<b>1</b>
a	Zuangtui New Incoming	0.5	3	1		1	1		1	1	1	
b	Luangmual		3	1		1	1		1	1	1	
<b>9</b>	<b>Sihhmui</b>		<b>3</b>	<b>1</b>	<b>1</b>	<b>3</b>	<b>3</b>		<b>3</b>	<b>1</b>	<b>3</b>	<b>1</b>
a	Luangmual		3	1		1	1		1	1	1	
b	Kolasib					1	1		1		1	
c	W Phaileng					1	1		1		1	
	<b>Total Quantity</b>	<b>9</b>	<b>45</b>	<b>18</b>	<b>9</b>	<b>23</b>	<b>23</b>	<b>25</b>	<b>20</b>	<b>18</b>	<b>23</b>	<b>9</b>

## A.2 Reference Item Schedule

SL No	Item Description	Unit	Qty
<b>A</b>	<b>Replacement of Low rating Current Transformer &amp; ACSR Panther Conductor with HTLS Panther Conductor</b>		
1	Providing and Fitting of Polymer insulator, 120kN(2 Nos. as a set) for 132kV overhead lines with double tension Assembly fittings, bolts and socket type and complete with nuts and bolts, washers arching horn etc. as directed by the engineer in charge.	Per string	150
2	Providing, laying and stringing of 132kV per circuit meter using HTLS panther conductor with Jungle clearance as directed by the engineer-in-charge. (Zuangtui New - Zuangtui Old -Luangmual SS) (including incoming bay and 132kV Mainbus) at 5% Sag.	Circuit m	9,000
3	Providing and erection of 132kV CT (4 core) without structure as directed by Engineer-in-charge. (1200-600-300/1-1-1-1A)	No	45
4	Dismantling of disc insulator, 90 kN (10 nos. as a set) for 132 kV overhead lines with insulator Dismantling, ball and socket type and complete with aluminium alloy tension clamps, bolts, nuts, washers etc as directed by the engineer in charge.	Per String	150

5	Dismantling of conductor, jumpering of 132kV line per circuit meter using Panther conductors with jungle clearance, as directed by the engineer in charge.	Circuit meter	9,000
<b>B</b>	<b>Line Differential Relays</b>		
1	Supply and Installation of Line Differential Relays at various Substations as per A.1	No	18
<b>C</b>	<b>Synchronizing Devices</b>		
1	Synchroscope, LED Type, 100 to 440V AC	No.	23
2	Dual Frequency Meter, 110V AC	No.	23
3	Dual Voltmeter 110V Secondary supply	No.	23
4	TNC Synchronizing Switch, 4 NO +4 NC, 32 A	No.	23
5	Rotary CAM switch, 90 Degree, 3P3W, 32A	No.	23
6	Auxiliary Contactor, Contact Multiplier, 110V DC supply	No.	46
7	DC Contactor, 110V DC, 32 A	No.	23
8	High Speed Master Tripping Relay, 110VDC, 8 NO + 2 NC, Electrical Reset	No.	23
	Installation & Commissioning of Synchronizing Devices listed above	No.	20
<b>D</b>	<b>Optics Power Ground Wire (OPGW) and Accessories</b>		
1	Providing, laying and stringing of 48 fibre(DWSM) optical Power Ground wire (OPGW) fibre optic in 132kV line with jungle clearance, as directed by the engineer in charge. (at 5%Wastage)	Rm	25000
<b>E</b>	<b>OPGW End Devices such as Metal Joint Box, FODB, ADSS Cable, Patchcordetc</b>		
1	ADSS 48 Fibre(DWSM) G.652D Single mode	Meter	4000
2	FODB SC 48ports	No.	20
3	Patchcord SC to SC Connectors (2m) Single mode G.652D	No.	1000
4	Patchcord SC to ST Connectors (10m) Single mode G.652D	No.	100
5	FODB Rack	No.	20
	Installation & Commissioning of OPGW End Devices listed above.	No.	17
<b>F</b>	<b>Carrier Aided Protection (DTPC - Digital Teleprotection Coupler)</b>		

1	VCL-TP, TeleProtection Terminal Equipment(or equivalent) 19-Inch, Rack mountable. Network Interfaces: - 1 x 2.048Mbps E1 (120 Ohms) interface [RJ45 (F)] Substation Interfaces: - upto 8, 2-way independent-simultaneous binary command channels Management: SNMP/Telnet Port (RJ45 (F)), Serial Port (USB, DB-9 COM) Serial Port, EMS, Graphical User Interface (GUI) Installation Kit: System Core Cables, Mounting Hardware, Documentation, User Manual - 2 x 48V DC Power Supply Input [Redundant] - Command Voltages : <b>110-125V DC</b> Includes: 1 x External Trip Counter Display 1 x External feed-through Terminal Block (TB) 60-I/O	No	18
2	E1 / FO Converter	No	18
3	IP41 complied 19" Telecom Cabinet 1800 (H) x 600 (W) x 600 (D)	No	18
<b>G</b>	<b>SCADA Visibility Devices</b>		
1	Rishmaster 3450 MFT(or equivalent)	No	23
2	CMR Relay	No	138
3	RS 486 Repeater	No	23
4	Power Supply Unit PSU	No	23
5	MFT Cable	Rm	23
6	Armour shielded twin cable	Rm	4600
	Installation & Commissioning of SCADA Visibility Devices listed above.	No.	20
<b>H</b>	<b>Battery Charger and Battery Bank</b>		
1	Providing and Installation of 48V Battery Charger (3-Phase, 415V) without DCDB.	Each	9
2	Providing and Installation of 48V, 100Ah Battery Bank.	Each	9
<b>I</b>	<b>Miscellaneous tools</b>		
1	Laptop computer for reporting Disturbance Records, etc.,	No.	9
<b>2</b>	Fiber Splicing Machine (FUJIKURA 48s+ or equivalent) with cleaver, cutter and spare accessories	No.	9
<b>3</b>	Optical Time Domain Reflectometer OTDR (Viavi 100ASor equivalent)	No.	9
4	Fiber Splicing tools kit	Set.	9
5	Hydraulics ACSR Conductor Cutter	No.	9
6	Hitools Automatic Clamp 6 Ton for ACSR Conductor (For HTLS)	No.	9
7	Hitools Automatic Clamp 3.5 Ton for Wire Rope & Earth Wire (For OPGW)	No.	9
8	1.5T Lever Ratchet Hoist	No.	9

9	6T Lever Ratchet Hoist	No.	9
10	Lever Ratchet Hoist Extra Chain	Meter	90
11	Lever Ratchet Hoist Extra Chain	Meter	90
12	Laser Source	No.	9
13	Power Meter	No.	9

#### **Part B - EPC Bid Price Schedule**

The bidder shall quote a single lump sum EPC price for complete design, engineering, supply, erection, testing and commissioning of the works covered under the tender.

#### **Lump Sum EPC Contract Price**

<b>Sl. No.</b>	<b>Description</b>	<b>Amount (INR)</b>
1	Total lump sum EPC price for design, engineering, supply, erection, testing and commissioning of 132kV Line Ring Synchronization Project-Phase I in Mizoram.	

**Note:** The price quoted above shall be lump sum EPC contract price inclusive of all taxes, duties, labour cess, levies, labour, materials, transportation, insurance, erection, testing, commissioning and all incidental costs necessary for successful completion of the works in accordance with the tender documents.



## SECTION – VII

### PRESCRIBED FORMS TO BE SUBMITTED ALONG WITH SUPPORTING DOCUMENTS

#### FORM 1 – EXPERIENCE DETAILS

Sl No	Project Name	Client	Scope	Voltage Level	Length (km)	Value (₹ Lakh)	Completion Year

#### FORM 2 – FINANCIAL TURNOVER

Sl. No.	Particulars	Details / Bidder Response
1	Financial Year 1 turnover	
2	Financial Year 2 turnover	
3	Financial Year 3 turnover	
4	Average annual turnover	
5	CA name, membership number and UDIN	

#### FORM 3 – PROFITABILITY STATEMENT

Year	Profit After Tax (₹ Lakh)	Positive/Negative

#### FORM 4 – FINANCIAL STRENGTH

Type (Bank/Net Worth)	Amount (₹ Lakh)	Issuing Authority	UDIN

#### FORM 5 – KEY MANPOWER

Sl No	Name	Qualification	Experience (Years)	Designation

**FORM 6**  
**INTEGRITY DECLARATION**

(Declaration to be made by the Bidder/Contractor)

I, \_\_\_\_\_ (Bidder's name) hereby declared that:

- 1) \_\_\_\_\_ (name of the firm) has not been blacklisted or debarred in the past by the Central/State Government or organization from taking part in Government tenders in India.

OR

The \_\_\_\_\_ firm/company was \_\_\_\_\_ debarred/blacklisted by \_\_\_\_\_ with effect from \_\_\_\_\_ to \_\_\_\_\_, and the said debarment/blacklisting has expired/been withdrawn. The firm/company is not debarred or blacklisted as on the date of submission of this bid.

- 2) No employees of the firm have direct relationship/relative(s) with officials dealing with the file connected with the tender being invited. (\*In case, if any employees of the firm have direct relationship/relative(s) with the officials, the same shall be disclosed by the bidder along with this declaration in Form A)
- 3) No employees of the Firm were involved in any illegal activities.
- 4) I have read, understood and comply with procurement rules, regulations and procedures.
- 5) I will provide accurate, complete and truthful information in my bid.
- 6) I will not engage in any collusive or anti-competitive behavior.
- 7) I will not offer or give any bribes, gifts or other improper benefits to influence the procurement process.
- 8) I will maintain the confidentiality of all procurement information.
- 9) I will not contact or influence any procurement officials or decision-makers improperly.

I understand that any breach of this declaration may result in disqualification from the procurement process, and I may be subject to further action as per applicable rules and law.

*"Relatives for the purpose of this declaration includes father including step-father, mother, including step mother, son including step-son, daughter-in-law, daughter, son-in-law, brother including step-brother, sister including step-sister"*

Name & Signature of Bidder with seal

**FORM 7**

**SITE VISIT CERTIFICATE**

Name of Work: \_\_\_\_\_

Tender No.: \_\_\_\_\_

Name of Bidder: \_\_\_\_\_

Name of Bidder's Representative: \_\_\_\_\_

Date of Site Visit: \_\_\_\_\_

Site / Route Visited: \_\_\_\_\_

This is to certify that the above-named bidder / bidder's representative has visited and inspected the site / route of the work before submission of bid.

The bidder / bidder's representative has acquainted himself with the site and route conditions, access roads, terrain conditions, line route constraints, shutdown requirements, storage and transportation arrangements, right of way issues, climatic conditions, and labour and logistics availability.

This certificate is issued for the purpose of tender submission.

Place: \_\_\_\_\_

Date: \_\_\_\_\_

Seal and Signature of Field Officer: \_\_\_\_\_

**FORM 8**

**FORM OF EARNEST MONEY(For Bank Guarantee)**

WHEREAS, contractor ..... (Name of contractor) (Hereinafter called “the Contractor”) has submitted his tender dated ..... (date) for the construction of.....(name of work) (Hereinafter called “the Tender”)

KNOW ALL PEOPLE by these presents that we (name of bank) having our registered office at.....(hereafter called “the Bank” are bound unto the Engineer-in-Chief, Power & Electricity Dept, Govt. of Mizoram in the sum of Rs..... (Rs. In words.....) for which payment will and truly to be made to the Engineer-in-Chief, the Bank binds itself, his successors and assigns by these presents.

SEALED with the common Seal of the said Bank this ..... Day of ..... 20.....

THE CONDITIONS of this obligation are :

- (1) If after tender opening the contractor withdraws, his tender during the period of validity of tender (including extended validity of tender) specified in the Form of Tender;
- (2) If the contractor having been notified of the acceptance of his tender by the Engineer-in-Charge:
  - a) Fails or refuses to execute the Form of Agreement in accordance with the Instructions to contractor, if required; Or
  - b) Fails or refuses to furnish the Performance Guarantee, in accordance with the provisions of tender document and instructions to contractor, Or
  - c) Fails or refuses to start the work, in accordance with the provisions of the contract and Instructions to contractor, Or
  - d) Fails or refuses to submit fresh Bank Guarantee of an equal amount of this Bank Guarantee, against Security Deposit after award of contract.

We undertake to pay to the Engineer-in-Charge up to the above upon receipt of his first written demand, without the Engineer-in-Charge having to substantiates his demand, provided that in his demand the Engineer-in-Charge will note that the amount claimed by him is due to him owing to the occurrence of one or any of the above conditions, specifying the occurred condition or conditions.

This Guarantee will remain in force up to and including the date\_\_\_\_\_after

the deadline for submission of tender as such deadline is stated in the Instructions to contractor or as it may be extended by the Engineer-in-Charge, notice of which extension(s) to the Bank is hereby waived. Any demand in respect of this guarantee should reach the Bank not later than the above date.

Date .....

SIGNATURE OF THE BANK

WITNESS .....

SEAL

(SIGNATURE, NAME AND ADDRESS)

**Form 9**  
**Form of Performance Security (Guarantee)**  
**Bank Guarantee Bond**

1. In consideration of the Governor of Mizoram (hereinafter called "The Government") having offered to accept the terms and conditions of the proposed agreement between \_\_\_\_\_ and \_\_\_\_\_ (hereinafter called "the said Contractor(s)") for the work \_\_\_\_\_ (hereinafter called "the said agreement") having agreed to production of irrevocable Bank Guarantee for Rs \_\_\_\_\_ (Rupees \_\_\_\_\_ only) as a security/guarantee from the contractor(s) for compliance of his obligations in accordance with the terms and conditions in the said agreement.  
We, \_\_\_\_\_ (hereinafter referred to as "the Bank") hereby undertake to  
(*indicate the name of the Bank*)  
pay to the Government an amount not exceeding Rs \_\_\_\_\_ (Rupees \_\_\_\_\_ only) on demand by the Government.
2. We, \_\_\_\_\_ (hereinafter referred to as "the Bank") do hereby undertake to  
(*indicate the name of the Bank*)  
pay the amounts due and payable under this guarantee without any demure, merely on a demand from the Government stating that the amount claimed as required to meet the recoveries due or likely to be due from the said contractor(s). Any such demand made on the Bank shall be conclusive as regard the amount due and payable by the Bank under this Guarantee. However, our liability under this guarantee shall be restricted to an amount not exceeding Rs \_\_\_\_\_ (Rupees \_\_\_\_\_ only).
3. We, the said bank further undertake to pay the Government any money so demanded notwithstanding any dispute or disputes raised by the contractor(s) in any suit or proceeding pending before any court or Tribunal relating thereto, our liability under this present being absolute and unequivocal.  
The payment so made by us under this bond shall be a valid discharge of our liability for payment thereunder and the Contractor(s) shall have no claim against us for making such payment.

4. We, \_\_\_\_\_ further agree that the guarantee herein contained shall  
(*indicate the name of the Bank*)  
remain in full force and effect during the period that would be taken for the performance of the said agreement and that it shall continue to be enforceable till all the dues of the Government under or by virtue of the said agreement have been fully paid and its claims satisfied or discharged or till Engineer-in-Charge on behalf of the Government certified that the terms and conditions of the said agreement have been fully and properly carried out by the said Contractor(s) and accordingly discharges this guarantee.
5. We, \_\_\_\_\_ further agree with the Government that the Government shall  
(*indicate the name of the Bank*)  
have the fullest liberty without our consent and without affecting in any manner our obligation hereunder to vary any of the terms and conditions of the said agreement or to extend time of performance by the said Contractor(s) from time to time or postpone for any time or from time to time any of the powers exercisable by the Government against the said Contractor(s) and to forbear or enforce any of the terms and conditions relating to the said agreement and we shall not be relieved from our liability by reason of any such variation or extension being granted to the said Contractor(s) or for any forbearance, act of omission on the part of the Government or any indulgence by the Government to the said Contractor(s) or by any such matter or thing whatsoever which under the law relating to sureties would but for this provision, have effect of so relieving us.
6. This guarantee will not be discharged due to the change in the constitution of the Bank or the Contractor(s).
7. We, \_\_\_\_\_lastly undertake not to revoke this guarantee except with  
(*indicate the name of the bank*)  
the previous consent of the Government in writing.
8. This guarantee shall be valid upto \_\_\_\_\_ unless extended on demand by the Government. Notwithstanding anything mentioned above, our liability against this \_\_\_\_\_ guarantee \_\_\_\_\_ is \_\_\_\_\_ restricted \_\_\_\_\_ in Rs \_\_\_\_\_ (Rupees \_\_\_\_\_ only) and unless a claim in writing is lodged with us within six

months of the date of expiry of the extended date of expiry of this guarantee all our liabilities under this guarantee shall stand discharged.

Dated the \_\_\_\_\_ day of \_\_\_\_\_

for \_\_\_\_\_ (*indicate the name of the bank*)



**Form 10**  
**BANK GUARANTEE**  
**(for Equipment/Mobilization Advance)**

To,  
The Engineer-in-Chief, P&ED (Employer)

\_\_\_\_\_

Aizawl: Mizoram.

**Subject: - (Please state the name of the work).**

Sir,

In accordance with the provision of the Conditions of Contract, in respect of Equipment/Mobilization Advance of the Contract Agreement for the above named work, (hereinafter called "the Contract" shall deposit with (Name of Employer)\_\_\_\_\_

a bank guarantee in an amount of (Amount of Guarantee) \_\_\_\_\_ (in words)\_\_\_\_\_

We, the (Bank) \_\_\_\_\_ as instructed by the Contractor, agree unconditionally and irrevocably to guarantee, as primary obligator and not as surety merely, the payment to (Name of Employer)\_\_\_\_\_ on his first demand, without any right of objection on our part and without his first claim to the Contractor, in the amount not exceeding (Amount of Guarantee) Rs\_\_\_\_\_ (In words \_\_\_\_\_)

in the event that the contractual obligations expressed in the said Clause of the above mentioned contract have not been fulfilled by the Contractor giving the right of claim to the Employer for recovery of the whole part of the Mobilization Advance Loan from the Contractor under the Contract or the Contractor's employment has been terminated in accordance to the said Conditions of Contract.

We further agree that no change or addition to or other modification of the terms of the Contract of works to be performed there under or of any of the Contract Documents which may be made between (name of Employer) \_\_\_\_\_ and the Contractor shall in any way release us from any liability under this guarantee, and we hereby waive notice of any such change, addition or modification.

This guarantee shall remain valid and in full effect from the date of the advance loan payment to the Contractor under the Contract until.

a) *(Name of Employer)* \_\_\_\_\_  
receives full repayment of the same amount including interests thereon, if any,  
from the Contractor.

b) \_\_\_\_\_ (Insert date to cover time  
period for completion plus 12 months defects liability period).

Yours truly

SIGNATURE AND SEAL

\_\_\_\_\_  
(Name and Designation)

Name of Bank/Financial Institution

Address:

Date:

WITNESS 1.

2.

**Form 11**  
**Standard Form of Agreement**  
(Notes on Standard Form of Agreement)

The Agreement should incorporate any corrections or modifications to the Bid resulting from corrections of errors (Instructions to Bidders, Clause 26).

**Agreement**

This agreement made the \_\_\_\_\_ day of \_\_\_\_\_ 20\_\_\_\_\_  
between \_\_\_\_\_ [name and address of  
Employer] (hereinafter called “the Employer”) of the one part, and  
\_\_\_\_\_ [name and address  
of Contractor] (hereinafter called “the Contractor”) of the other part).

Whereas the Employer is desirous that the Contractor execute  
\_\_\_\_\_  
[name and identified number of Contract] (hereinafter called “the Works”) and the  
Employer has accepted the Bid by the Contractor for the execution and completion of  
such Works and the remedying of any defects therein at a cost of  
Rupees.....

**NOW THIS AGREEMENT WITNESSETH** as follows:

1. In this Agreement, words and expressions shall have the same meanings as are respectively assigned to them in the Conditions of Contract hereinafter referred to, and they shall be deemed to form and be read and construed as part of this Agreement.
2. In consideration of the payments to be made by the Employer to the Contractor as hereinafter mentioned, the Contractor hereby covenants with the Employer to execute and complete the Works and remedy any defects therein in conformity in all aspects with the provisions of the Contract.
3. The Employer hereby covenants to pay the Contractor in consideration of the execution and completion of the works and the remedying the defects wherein the Contract price or such other sum as may become payable under the provisions of the Contract at the times and in the manner prescribed by the Contract.

4. The following documents shall be deemed to form and be read and construed as part of this Agreement, viz:
- i) Letter of Acceptance;
  - ii) Notice to proceed with the works;
  - iii) Contractor's Bid;
  - iv) Contract Data;
  - v) Special Conditions of Contract and General Conditions of Contract;
  - vi) Specifications;
  - vii) Bill of Quantities; and
  - viii) Any other document listed in the Contract Data as forming part of the contract.

In witness whereof the parties thereto have caused this Agreement to be executed the day and year first before written.

The Common Seal of

---

was hereunto affixed in the presence of  
Signed, Sealed and Delivered by the said

---

---

In the presence of:

Binding Signature of Employer

---

Binding Signature of Contractor

---

