# BHUTAN POWER CORPORATION LIMITED

*(An ISO 9001:2015, ISO 14001:2015 & OHSAS 18001:2007 Certified Company)*

*(Registered Office, Thimphu)*

## PROCUREMENT SERVICES DEPARTMENT

## THIMPHU: BHUTAN

**(Tender No. BPC/PSD/Tender/2021/13)**

# BID DOCUMENT

# FOR

# THE SUPPLY AND DELIVERY OF ELECTRICAL MATERIALS

Procurement Services Department ★ Thimphu : Bhutan ★ Bhutan Power Corporation Limited

**TENDER NO:** **BPC/PSD/Tender/2021/13**
**DATE:** **17 April, 2021**
**WORK:** **Supply and Delivery of Electrical Materials.**

## CONTENTS OF THE BID DOCUMENT

## CHECKLIST FOR BID SUBMISSION

| Sl # | PARTICULARS | Purchasers Requirement | Bidders to fill up |
|---|---|---|---|
| | | YES/NO | YES/NO |
| 1 | Signed Bid Form and Price Schedule (BOQ) | **YES** | |
| 2 | Power of Attorney | **YES** | |
| 3 | Valid Trade License/ Manufacturing License | **YES** | |
| 4 | Manufacturer's authorisation (In case the supplier is a dealer) | **YES** | |
| 5 | Document Establishing Eligibility of the Bidder | **YES** | |
| 6 | Documents establishing of the Bidders qualification to perform the contract | **YES** | |
| 7 | Documents establishing the goods' conformity to the bidding documents | **YES** | |
| 8 | Guaranteed Technical Particulars (GTP) | **YES** | |
| 9 | EMD drawn in favour of Director, Finance & Account Services, BPC, Thimphu, Bhutan. | **YES** | |
| 10 | Signed Integrity Pact | **YES** | |
| 11 | Signed Vendor Performance Management System (VPMS) | **YES** | |
| 12 | Joint Venture, Consortium or Association (JV/C/A) Partner Information Form (If applicable) | **YES** | |

Procurement Services Department ★ Thimphu : Bhutan ★ Bhutan Power Corporation Limited

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Bhutan Power Corporation Limited
*(An ISO 9001:2015, ISO 14001:2015 & OHSAS 18001:2007 Certified Company)*
**Registered Office, Thimphu**
**Procurement Services Department**
**Thimphu: Bhutan**

## Invitation for Bids

Date: 17th April, 2021
Tender No.: BPC/PSD/Tender/2021/13

1. The *Procurement Services Department* invites sealed bids from eligible bidders for the *Supply and Delivery of Electrical Materials.*

2. Interested eligible bidders may obtain further information on the bid form and inspect the bidding documents at the office of *General Manager, Procurement Services Department, Bhutan Power Corporation Ltd., Thimphu, Bhutan.*

3. A complete set of bidding documents can be purchased by any interested eligible bidder on the submission of written application to the above address on or before ***12:30 hours*** **on 18th May 2021** and upon payment of non-refundable fee of **Nu. 1,000.00**.

4. Bidding documents can be also downloaded from the Purchaser's website but should register with the Purchaser on or before **12*:30 hours* on 18th May 2021** after paying registration fee of **Nu. 200.00** (Ngultrum Two Hundred) only. The registration shall be done through written application together with the business license copy and tax clearance to make the bid enforceable.

5. All bids must be accompanied by a bid security and must be delivered in accordance with the Instructions to Bidder on or before ***13:00 hours*** **on 18th May 2021** and will be publicly open immediately thereafter.

| Lot Description | Amount (Nu.) |
|---|---|
| *Lot 1: ACSR Conductors* | *34,653.00* |
| *Lot 2: Distribution Pillar, Spike Earthing and Lightening Arrestor* | *124,848.00* |
| *Lot 3: Cable Jointing Kits* | *29,749.00* |
| *Lot 4: Transformer Oil* | *28,526.00* |
| *Lot 5: Lugs and Compression Glands* | *31,000.00* |
| *Lot 6: Battery Bank with charger* | *9,845.00* |
| *Lot 7: Miscellaneous* | *9,712.00* |

Procurement Services Department ★ Thimphu ★ Bhutan ★ Limited

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|---|---|
| *Lot 8: Auto Recloser Circuit Breaker* | *102,120.00* |
| *Lot 9: Distribution Transformer Meters* | *1,269,580.00* |
| *Lot 10: Numerical Relays* | *190,565.00* |
| *Lot 11: Sectionalizer* | *479,032.00* |

6. *Procurement Services Department, Bhutan Power Corporation Ltd.* shall not be responsible for any costs or expenses incurred by bidders in connection with the preparation or delivery of bids.

(General Manager)

Procurement Services Department ★ Thimphu : Bhutan ★ Bhutan Power Corporation Limited

# PART 1- Bidding Procedures

**Section I. Instructions to Bidders**

## Table of Contents

## Section I. Instructions to Bidders

# A. General

**1. Scope of Bid**

| | | |
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| 1.1 | The Purchaser, as indicated in the Bid Data Sheet (BDS), issues these Bidding Documents for the supply of Goods and Services incidental thereto as specified in Section V, Schedule of Supply. Tender number and tender description, lot numbers and lot description are provided in the BDS. | |
| 1.2 | All bids are to be completed and returned to the Purchaser in accordance with these instructions to the bidders. | |
| 1.3 | Throughout this Bidding Document : | |
| | a. | the term "in writing" means communicated in written form with proof of receipt; |
| | b. | if the context so requires, singular means plural and vice versa; and |
| | c. | "day" means calendar day |

**2. Fraud and Corruption**

| | | | |
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| 2.1 | It is Corporation policy to require that Purchasers, Bidders and Suppliers observe the highest standards of ethics during the procurement and execution of contracts.[1] In pursuance of this policy, the Corporation: | | |
| | a. | defines, for the purposes of this provision, the terms set forth below as follows: | |
| | | i. | "Corrupt practice"[2] is the offering, giving, receiving or soliciting, directly or indirectly, of anything of value[3] to influence improperly the actions of another party; |

[1] In this context, any action taken by a Bidder, and Supplier to influence the procurement process or contract execution for undue advantage is improper.

[2] "another party" refers to a Corporation official acting in relation to the procurement process or contract execution. In this context, "Corporation official" includes employees of BPC taking or reviewing procurement decisions.

[3] "anything of value" includes, but is not limited to, any gift, loan, fee, commission, valuable security or other asset or interest in an asset; any office, employment or contract; any payment, discharge or liquidation of any loan, obligation or other liability whatsoever, whether in whole or in part; any other services, favour or advantage, including protection from any penalty or disability incurred or apprehended or from any action or proceeding of a disciplinary or penal nature, whether or not already instituted and including the exercise or the forbearance from the exercise of any right or any official power or duty.

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| | | ii. | | "Fraudulent practice"[4] is any intentional act or omission, including a misrepresentation, that knowingly or recklessly misleads, or attempts to mislead, a party to obtain a financial or other benefit or to avoid an obligation; |
| | | iii. | | "Collusive practice"[5] is an arrangement between two or more parties designed to achieve an improper purpose, including to influence improperly the actions of another party; |
| | | iv. | | "Coercive practice"[6] is impairing or harming, or threatening to impair or harm, directly or indirectly, any party or the property of the party to influence improperly the actions of a party; |
| | | v. | | "Obstructive practice" is |
| | | | aa. | deliberately destroying, falsifying, altering or concealing of evidence material to the investigation or making false statements to investigators in order to impede any investigation into allegations of a corrupt, fraudulent, coercive or collusive practice; and/or threatening, harassing or intimidating any party to prevent it from disclosing its knowledge of matters relevant to the investigation or from pursuing the investigation; or |
| | | | bb. | acts intended materially to impede the exercise of the inspection and audit rights of the Purchaser or any person appointed by the Purchaser and/or any relevant agency provided for under ITB Sub-Clause 2.1 (d) below. |
| | b. | will reject a proposal for award if it determines that the Bidder recommended for award has, directly or through an agent, engaged in corrupt, fraudulent, collusive, coercive or obstructive practices in competing for the contract in question; | | |
| | c. | will sanction a firm or individual, including declaring them ineligible, either indefinitely or for a stated period of time, to be awarded contract if it at any time determines that they have, directly or through an agent, engaged in corrupt, fraudulent, collusive, coercive or obstructive practices in competing for, or in executing contract; | | |
| | d. | will have the right requiring Bidders and Suppliers to permit the Purchaser, any agency or person appointed by the Purchaser to inspect their accounts and records and other documents relating to their Bid submission and contract performance and to have them audited by auditors appointed by the Purchaser; | | |

[4] a "party" refers to a Corporation official; the terms "benefit" and "obligation" relate to the procurement process or contract execution; and the "act or omission" is intended to influence the procurement process or contract execution.

[5] "parties" refers to participants in the procurement process (including corporation officials) and an "improper purpose" includes attempting to establish bid prices at artificial, non competitive levels.

[6] a "party" refers to a participant in the procurement process or contract execution.

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| | e. | requires that Bidders, as a condition of admission to eligibility, execute and attach to their bids an Integrity Pact Statement in the form provided in Section IV, Bidding Forms. Failure to provide a duly executed Integrity Pact Statement shall result in disqualification of the Bid; and |
| | f. | will report any case of corrupt, fraudulent, collusive, coercive or obstructive practice to the relevant RGoB agencies, including but not limited to the Anti-corruption Commission (ACC) of Bhutan, for necessary action in accordance with the statutes and provisions of the relevant agency. |
| **3.** | **Eligible Bidders** | |
| 3.1 | The Invitation for bids is open to all Manufacturers/Export House/Authorized Dealers from outside Bhutan and to Manufacturers/Authorized Dealers/National Suppliers licensed under the Ministry of Economic Affairs of Royal Government of Bhutan (Supporting evidence to corroborate the claim must be enclosed). | |
| 3.2 | A Bidder shall not be eligible who have a conflict of interest. All Bidders found to have a conflict of interest shall be disqualified. Bidders are considered to have a conflict of interest in this bidding process if they: | |
| | a. | are associated, or have been associated in the past, with a firm or any of its affiliates which has been engaged by the Purchaser to provide consulting services for the preparation of the design, specifications and/or other documents to be used for the procurement of the Goods to be purchased pursuant to these Bidding Documents, or |
| | b. | employ or otherwise engage, either directly or through any of their affiliates, a family member of a Corporation who either is employed by the Purchaser or has an authority over it. For the purposes of this Sub-Clause a family member is defined as parents, spouse and children as mentioned in the Service Record of the employee. |
| **4.** | **Exclusion of Bidders** | |
| 4.1 | A bidder shall be excluded from participating in a procurement procedure under the following circumstances who: | |
| | a. | is suspended/debarred by any Statutory Agencies in Bhutan or in the region to Corporation's knowledge; |
| | b. | has been declared bankrupt, judgment or pending legal action that could impair operating as a going concern; |
| | c. | has been found guilty of professional misconduct by a recognised tribunal; |

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| | d. | has not fulfilled his obligations with regard to any statutory dues; |
| | e. | is or has been guilty of serious misrepresentation in supplying information required under this Section. |
| | f. | is debarred from participation in any public procurement by any Competent Authority as per law; |
| | g. | does not qualify under the performance assessed through the Vendor Performance Management System of the Corporation; |
| | h. | as a matter of law or official regulation, Royal Government of Bhutan prohibits commercial relations with the country in which the Bidder is constituted, incorporated or registered. |

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| **5. Vendor Performance Management System (VPMS)** | |
| 5.1 | The performance of the vendor shall be assessed as per the guidelines contained in the Vendor Performance Management System available in BPC website (www.bpc.bt) for the purpose of determining the eligibility in participating in subsequent tenders. |
| 5.2 | The VPMS acceptance form is provided in the Section IV, Bidding Forms of the bidding documents. The bidders are required to sign VPMS Acceptance Form agreeing to the applicability of VPMS. In case the VPMS Acceptance Form is not signed, the bid for that bidder shall be liable for rejection. |

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| **6. Joint Ventures (JV)** | | |
| 6.1 | Bids submitted by a Joint Venture of two or more Companies as partners shall comply with the following requirements: | |
| | a. | the Bid, and in case of successful Bid, the Contract form, shall be signed so as to be legally binding on all partners; |
| | b. | one of the partners shall be authorized to be in charge; and this authority shall be evidenced by submitting a power of attorney signed by legally authorized signatories of all the partners; |
| | c. | the partner in charge shall be authorized to incur liabilities, receive payments and receive instructions for and on behalf of any or all partners of the joint venture; |
| | d. | all partners of the joint venture shall be liable jointly and severally for the execution of the Contract in accordance with the Contract terms, and a relevant statement to this effect shall be included in the authorization mentioned under (b) above as well as in the Bid Form and the Form of Agreement (in case of a successful Bid); and |

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| | e. | a copy of the registration certificate/license of joint venture shall be submitted with the Bid; |

## B. Contents of Bidding Documents

**7. Sections of Bidding Documents**

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| 7.1 | The Bidding Document consist of Parts 1, 2, and 3, which include all the Sections indicated below, and should be read in conjunction with any Addenda issued in accordance with ITB 9. |
| | **PART 1 Bidding Procedures**<br>• Section I. Instructions to Bidders (ITB)<br>• Section II. Bid Data Sheet (BDS)<br>• Section III. Evaluation and Qualification Criteria<br>• Section IV. Bidding Forms<br>**PART 2 Supply Requirements**<br>• Section V. Schedule of Supply<br>**PART 3 Conditions of Contract and Contract Forms**<br>• Section VI. General Conditions of Contract (GCC)<br>• Section VII. Special Conditions of Contract (SCC)<br>• Section VIII. Contract Forms |
| 7.2 | The Purchaser is not responsible for the completeness of the Bidding Document and its addenda, if they were not obtained directly from the Purchaser. |
| 7.3 | The bidder is expected to examine the bidding documents, including all instructions, forms, terms and specifications. Failure to furnish all information required by the bidding documents or submission of a bid not substantially responsive to the Bidding Documents in every respect would result in the rejection of that Bid. |

**8. Clarification of Bidding Documents**

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| 8.1 | The bidders shall not be allowed to seek any clarifications on the bidding documents in person or through any verbal communications. |
| 8.2 | Prospective bidders requiring any further information or clarification of the bidding documents may notify the Purchaser in writing at the Purchaser's mailing address indicated in the BDS. The Purchaser will respond in writing to any request for information or clarification of the bidding documents, which it |

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| | receives no later than 10 (ten) days prior to the deadline for the submission of Bids prescribed by the Purchaser. The Purchaser's response (including an explanation of the query) will be sent in writing to all prospective bidders who have purchased the Bidding Documents. |
| 8.3. | Pre bid meeting shall be conducted if necessary to clarify doubts and concerns of the bidders prior to submission of bids. Minutes of the pre bid meeting shall be circulated to all bidders that have purchased bidding documents and shall form an integral part of the bidding document. |

**9. Amendment of Bidding Documents**

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| 9.1 | At any time prior to the deadline for submission of bids, the Purchaser may, for any reason, whether at its own initiative or in response to a clarification requested by a prospective bidder, modify the Bidding Documents by addendum. |
| 9.2 | The addendum shall be part of the Bidding Documents and shall be notified in writing to all prospective bidders who have purchased the Bidding Documents. Such addendum shall be binding and shall require that prospective Bidders confirm receipt of it before the time established for the opening of Bids. |
| 9.3 | In order to afford prospective bidders reasonable time in which to take the addendum into account in preparing their Bids, the Purchaser may, at its discretion, extend the deadline for the submission of Bids. |
| 9.4 | Prospective bidders who may have downloaded the bidding documents from the website, the corrigendum to the bidding documents will also be published on the web site. It will be the responsibility of such bidders to regularly visit the website for any addendum to the bidding documents until the last date of bid submission. Purchaser shall in no way be responsible for any ignorance of the bidder about the addendum to the bidding documents. |

# C. Preparation of Bids

**10. Cost of Bidding Documents**

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| 10.1 | The bidder shall bear all costs associated with the preparation and delivery of its bid and the Purchaser will in no case be responsible or liable for those costs, regardless of the conduct or outcome of the bidding process. |
| 10.2 | Prospective bidders who may have downloaded the bidding documents from the web site should register with Purchaser on or before the closing of Bid Sale Date and make payment for the cost of the bid documents. |

**11. Language of Bid**

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| 11.1 | The Bid and all correspondence and documents relating to the Bid exchanged by the bidder and the Purchaser shall be written in the language specified in the BDS. Supporting documents and printed literature that are part of the Bid may be in another language provided they are accompanied by an accurate translation of the relevant passages in language specified in BDS, in which case, for purposes of interpretation of the Bid, *such* translation shall govern. |

**12. Documents Comprising the Bid**

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| 12.1 | The Bid shall comprise the following: | |
| | a. | Bid Form and Price Schedules completed in accordance with ITB13, 14,16 and 17; |
| | b. | Documentary evidence establishing in accordance with ITB 18, that the bidder is eligible to bid. |
| | c. | Documentary evidence establishing in accordance with ITB 19, that the bidder is qualified to perform the Contract if its Bid is accepted; |
| | d. | Documentary evidence establishing in accordance with ITB 20, that the goods to be supplied by the bidder conform to the Bidding Documents; |
| | e. | Bid security furnished in accordance with ITB 22; |
| | f. | Written confirmation authorizing the signatory of the Bid to commit the Bidder, in accordance with ITB 23; |
| | g. | Alternative bids, if permissible, in accordance with ITB 15; |
| | h. | Integrity Pact Statement, in accordance with ITB 2.1(e); |
| | i. | VPMS acceptance form, in accordance with ITB 5; and |
| | j. | Any other document required as per the bidding documents. |

**13. Bid form**

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| 13.1 | The bidder shall complete the Bid Form furnished in Section IV, Bidding Forms. This form must be completed without any alterations to its format, and no substitutes shall be accepted. All blank spaces shall be filled in with the information requested. A bid in which the bid form is not duly filled, signed and sealed by the bidder shall be rejected. |

**14. Price Schedules**

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| 14.1 | The bidder shall complete the appropriate Price Schedule included herein, stating the |

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| | unit prices, total price per item, the total amount and the expected countries of origin of the Goods to be supplied under the Contract. This Price Schedules form must be completed without any alterations to its format, and no substitutes shall be accepted. | | |
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| **15.** | **Alternative Bids** | | |
| | | | |
| 15.1 | Unless otherwise indicated in the **BDS**, alternative bids shall not be considered. | | |
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| **16.** | **Bid Prices and Discounts** | | |
| | | | |
| 16.1 | The prices and discounts quoted by the Bidder in the Bid Form and in the Price Schedules shall conform to the requirements specified below. | | |
| 16.2 | All lots and items must be listed and priced separately in the Price Schedules. | | |
| 16.3 | The price to be quoted in the Bid Form shall be the total price of the Bid excluding any discounts offered. | | |
| 16.4 | The Bidder shall quote any unconditional discounts and the methodology for their application in the Bid Form. The discount letter offer shall be accepted only when enclosed inside the main envelope of the bidding document. | | |
| 16.5 | The terms EXW, CIF, CIP, DDP and other similar terms shall be governed by the rules prescribed in the current edition of Incoterms, published by The International Chamber of Commerce, at the date of the Invitation for Bids or as specified in the **BDS**. | | |
| 16.6 | Prices shall be quoted as specified in each Price Schedule included in Section IV, Bidding Forms. The disaggregation of price components shall be solely for the purpose of facilitating the comparison of Bids by the Purchaser. This shall not in any way limit the Purchaser's right to contract on any of the terms offered: | | |
| | a. | For Goods manufactured in Bhutan: | |
| | | i. | the price of the Goods, quoted ex works, ex-factory, ex-warehouse, ex showroom or off-the-shelf, as applicable, including all Customs duties and sales and other taxes already paid or payable on the components and raw material used to manufacturer or assembly of Goods, if specified in BDS; |
| | | ii. | any Bhutan sales and other similar taxes which will be payable on the Goods if the contract is awarded to the Bidder, if specified in BDS; and |
| | | iii. | the total price for the item. |
| | b. | For Goods to be offered from outside Bhutan: | |

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| | | i. | the price of the Goods, quoted CIP/DDP place of entry in Bhutan, as specified in BDS; |
| | | ii. | custom duties and any other taxes which will be payable on the Goods in Bhutan, if specified in BDS; |
| | | iii. | the cost of inland transportation, insurance and other local costs incidental to delivery of the Goods from the port of entry to their final destination, if specified in BDS; and |
| | | iv. | the total price for the item. |
| | c. | For Related Services, other than inland transportation and other services required to convey the Goods to their final destination, whenever such Related Services are specified in Section V, Schedule of Supply: | |
| | | i. | the price of each item compromising the Related Services (inclusive of any applicable taxes). |
| 16.7 | Prices quoted by the Bidder shall be fixed during the Bidder's performance of the Contract and not subject to variation on any account, unless otherwise specified in the BDS. A bid submitted with an adjustable price quotation shall be treated as non-responsive and shall be rejected pursuant to ITB 33 unless adjustable price quotations are permitted by the BDS. If, in accordance to BDS, prices quoted by the Bidder shall be subject to adjustments during the performance of the Contract, a Bid submitted with a fixed price quotation shall not be rejected, but price adjustment shall be treated as zero. | | |
| 16.8 | If so indicated pursuant to ITB 1.1, Bids are based on Lots/Packages, for which all goods are grouped in lots for easy identification.<br><br>For the purpose of bidding and inventory management, related SKUS shall be grouped under specific lots like transformers, conductors, cables and fabrication items or in the manner most advantageous to the BPC for a particular tender.<br><br>Bidders shall have the option of submitting a proposal on any or all LOTS. Each lot consists of items grouped in packages. Unless otherwise indicated in the BDS, prices quoted shall correspond to one hundred percent (100%) of the items specified for each lot and to one hundred percent (100%) of the quantities for each item of a lot. Bidders can offer any price reduction (discount) for any or all Lots and shall specify in their Bid the price reductions applicable to each Lot, or for all the Lots. Price reductions or discounts shall be submitted in accordance with ITB 16.4. | | |
| **17.** | **Bid Currencies** | | |
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| 17.1 | Bid Prices shall be quoted in Ngultrum for goods offered from Bhutan, in Indian Rupees for goods offered from India; and in US dollar/major foreign currencies for goods offered from other Countries.<br><br>Bid Prices expressed in Indian currency and US Dollars/ major foreign currencies shall be accepted and evaluated in accordance to ITB 37. For bid evaluation purpose the exchange rate will be based on the Telegraphic Transfer (TT) selling rate published by the Royal Monetary Authority of Bhutan on the day of bid opening. For bid expressed in Indian currency and US Dollars/major foreign currencies, payments shall be made in equivalent Ngultrum through banking channel and the responsibilities of payment transfer and transfer charges lie on the Suppliers. |
| **18.** | **Documents Establishing Eligibility of the Bidder** |
| | |
| 18.1 | The bidder shall furnish, as part of its Bid, certification establishing the bidder's eligibility to bid pursuant to ITB 3. |
| 18.2 | The necessary documents and literatures viz. ISO Certificate, Type Test Certificates and Lists of Past Performance Certificates from the users must be submitted for new makes/brands introduced in Bhutan. |
| 18.3 | If the Bidder is JV in accordance with ITB 6, a copy of the registration certificate/license shall be submitted. |
| **19.** | **Documents Establishing Qualifications of the Bidder.** |
| | |
| **19.1** | The documentary evidence of the Bidder's Qualification to Perform the Contract, if its bid is accepted, shall establish to the purchaser's satisfaction: |
| | a. That, if required by the BDS, a Bidder is not a manufacturer or otherwise produce the goods it offers to supply, shall submit the Manufacturer's Authorization using the form included in Section IV, Bidding Forms to demonstrate that it has been duly authorized by the' manufacturer or producer of the Goods to supply these Goods in Bhutan; |
| | b. That, if required by the BDS, in the case of a bidder not doing business in Bhutan, the Bidder is, or will be (if the contract is awarded to it), represented by authorised representative in Bhutan equipped and able to carry out the Supplier's maintenance, repair and spare parts-stocking obligations prescribed in the Conditions of Contracts and/or Technical Specifications. |
| | c. That the Bidder meets each of the qualification criteria specified in Section III, Evaluation and Qualification Criteria. |
| | |
| **20.** | **Documents Establishing the Goods' Conformity to the Bidding Documents.** |
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| 20.1 | To establish the conformity of the Goods to the Bidding Documents, the Bidder shall furnish as a part of its Bid, the documentary evidence that the Goods conform to the technical specifications and standards specified in Section V, Schedule of Supply. |
| 20.2 | The documentary evidence may be in the form of literature, drawings or data, and shall consists of a detailed item by item description of the essential technical and performance characteristics of Goods. If required by the BDS, the bidders are required to confirm and sign on the guaranteed technical particulars of the goods (GTPS) that is indicated in the Section V, Schedule of Supply. Any deviations from the indicated specifications must be clearly indicated in the deviation schedule, Section IV, Bidding Form. |
| 20.3 | If required, the Bidder shall also furnish a list giving full particulars, including available sources and current prices, of all spare parts, special tools, etc., necessary for the proper and continuing functioning of the Goods. |
| 20.4 | Standards for workmanship, material and equipment, and references to brand names or catalogue numbers, specified by the Purchaser in Section V, Schedule of Supply, are intended to be descriptive only and not restrictive. The bidder may offer other standards of quality, brand names and/or catalogue numbers in its Bid, provided that it demonstrates to the Purchaser's satisfaction that the substitutions are equivalent or superior to those designated in Section V, Schedule of Supply with the exception in strategic critical and strategic security items category. |
| 20.5 | In order to prove that the Goods offered are of acceptable quality and standard, the bidders shall furnish the documentary evidence that the Goods offered have been in production and all relevant catalogues, test certificates, ISO certificates, list of previous clients, value of business and company or manufacturer profile for all new brands are submitted. |
| **21.** | **Period of Validity of Bids** |
| | |
| 21.1 | Bids shall remain valid for the period specified in the BDS days from the date of bid opening prescribed by the Purchaser, pursuant to ITB 28. A bid valid for a shorter period shall be rejected by the Purchaser as non-responsive. |
| 21.2 | In exceptional circumstances, prior to the expiration of the bid validity period, the Purchaser may solicit bidder's consent to an extension of the period of bid validity. The request and the responses thereto shall be made in writing. If the bidder agrees to the extension request, the validity of the bid security provided under ITB 22 shall also be suitably extended. In the event the Bidder refuses the request, the bid shall be disqualified without forfeiting the bid security. Bidders granting the request shall not be required or permitted to modify its Bid. |
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| **22.** | **Bid Security** |
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| 22.1 | The bidder shall furnish, as part of its Bid, a Bid Security in original form, denominated in Ngultrum or a freely convertible currency and in amount specified |

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| | in the BDS. | | |
| 22.2 | The Bid Security shall be in one of the following forms acceptable to the purchasers: | | |
| | a. | Unconditional bank guarantee issued by a reputed Financial Institution acceptable to the Purchaser in the Bid Security Form included in Section IV Bidding Form or another form acceptable to the Purchaser. | |
| | b. | Banker's cheque/ cash warrant. | |
| | c. | Demand draft. | |
| | d. | If the institution issuing the Bid Security furnished by the Bidder is located outside the Purchaser's country, the Bid Security shall be counter guaranteed by a correspondent financial institution located in the Purchaser's country to make it enforceable, | |
| 22.3 | The Bid Security shall be valid for period of thirty (30) days beyond the validity period of the Bids as specified in BDS. | | |
| 22.4 | Any Bid not secured in accordance with ITB 22.1, 22.2 and 22.3 above shall be rejected by the Purchaser as non-responsive. | | |
| 22.5 | An unsuccessful bidder's bid security will be discharged/returned within fifteen (15) days after signing of the Contract with the successful Bidder. | | |
| 22.6 | The successful bidder's bid security will be discharged/returned upon furnishing the performance security, pursuant to ITB 46 and the bidder's executing the Contract, pursuant to ITB 47 . | | |
| 22.7 | The bid security may be forfeited: | | |
| | a. | If a bidder withdraws its Bid during the period of bid validity specified by the bidder on the Bid Form, except as provided in ITB 21.2; | |
| | b. | If a bidder does not accept arithmetical corrections of its bid price; | |
| | c. | In the case of a successful bidder, if the bidder fails | |
| | | i. | To sign the Contract in accordance with ITB 47; or |
| | | ii. | To furnish the performance security in accordance with ITB 48. |
| | | | |
| 22.8 | The Bid Security of a JV must be from the JV that submits the Bid. | | |
| | | | |

**23. Formats and Signing of Bid**

| | |
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| 23.1 | The Bidder shall prepare one original of the documents comprising the Bid as described in ITB 12 and clearly mark it as "Original ". In addition, the Bidder shall submit copies of the Bid, in the number specified in the BDS and clearly mark them "COPY". In the event of any discrepancy between the original and the copies, the original shall prevail. |
| 23.2 | The original and all copies of the Bid shall be typed or written in indelible ink and shall be signed by the bidder or a person(s) duly authorized to sign on behalf of the bidder. Written power-of-attorney shall indicate such authorization and shall be attached to the Bid. The name and position held by each person signing must be typed or printed below the signature. |
| 23.3 | The Bid shall contain no interlineations, erasures or overwriting except as necessary to correct errors made by the bidder, in which case such correction shall be initialled by the person or persons signing the Bid. |

# D. Submission and Opening of Bids

**24. Submission, Sealing and Marking of Bids**

| | | |
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| 24.1 | Bids shall be delivered by hand, courier or registered post. The Bidder shall seal the original of the Bid and the number of copies stipulated in the BDS, including alternative Bids if permitted in accordance with ITB 15 in separate inner envelopes contained within one outer envelope. All envelopes shall be sealed with adhesive or other sealant to prevent reopening. | |
| 24.2 | The inner envelopes shall: | |
| | a. | Be sealed and bear the name of the Bidder. |
| | b. | Be marked "ORIGINAL", "ALTERNATIVE" (if any) and "COPY". |
| 24.3 | The outer envelope shall: | |
| | a. | Be marked "Confidential"; |
| | b. | Bear the name and address of the Bidder; |
| | c. | Be addressed to the Purchaser in accordance with ITB 25.1; |
| | d. | Bear the identification number pursuant to ITB 1.1 and any additional identification marks as specified in the BDS; and |
| | e. | Bear a warning not to open before the time and date for bid opening, in accordance with ITB 29.1. |

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| 24.4 | If the outer envelope is not sealed and marked as required by ITB 24.3, the Purchaser will assume no responsibility for the bid misplacement or premature opening. |
| **25.** | **Deadline for submission of Bids** |
| | |
| 25.1 | Bids shall be delivered by hand, courier or registered post to the Purchaser at the address and no later than the date and time indicated in BDS. |
| 25.2 | The Purchaser may, at its discretion, extend the deadline for the submission of Bids by amending the Bidding Documents in accordance with ITB 9, in which case all right and obligations of the Purchaser and bidders previously subject to the deadline will thereafter be subject to the deadline as extended. |
| **26.** | **One Bid per Bidder** |
| | |
| 26.1 | Each bidder shall submit only one Bid either by itself, or as a partner in a joint venture or as a responsible officer in the management of the company. A bidder who submits or participates in more than one Bid (except alternative Bids if allowed, pursuant to ITB 15) shall be disqualified. |
| **27.** | **Late Bids** |
| | |
| 27.1 | Any Bid received by the Purchaser after the deadline for Submission of Bids prescribed by the Purchaser, pursuant to ITB 25, shall be declared "Late" and rejected and returned unopened to the bidder. |
| | |
| **28.** | **Modification, Substitution and withdrawal of Bids** |
| | |
| 28.1 | The bidder may modify or substitute its Bid after it has been submitted by sending a written notice in accordance with the ITB 24, duly signed by an authorized representative, and shall include a copy of authorization in accordance with ITB 23.2. The corresponding substitution or modification of the Bid must accompany the respective written notice. All notices must be: |
| | a. Submitted in accordance with ITB 23 and 24, and in addition, the respective envelops shall be clearly marked "SUBSTITUTION" or "MODIFICATION;' and |
| | b. Received by the Purchaser prior to the deadline prescribed for the submission of Bids, in accordance with ITB 25. |
| 28.2 | The bidder may withdraw its Bid after it has been submitted by sending a written notice prior to the deadline prescribed for the submission of Bids, in accordance with ITB 25, duly signed by an authorized representative, and shall include a copy of authorization in accordance with ITB 23.2.<br><br>The Purchaser then shall mark the envelope as "WITHDRAWN". |
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| 28.3 | No Bid may be modified, substituted or withdrawn in the interval between the deadline for submission of Bids and the expiration of the period of bid validity specified by the bidder on the Bid Form or any extension thereof, neither any modification shall be accepted. |
| **29.** | **Bid Opening** |
| | |
| 29.1 | The Purchaser shall conduct the bid opening in the place at the address, date and time specified in the BDS in the presence of bidders or bidders' authorized representatives who choose to attend. |
| 29.2 | The bidder's authorized representatives attending the bid opening shall have an Authorization Letter from the bidder. Only the authorized representative shall attend the bid opening. |
| 29.3 | The bidders or bidder's authorized representatives shall not be permitted to approach the members of the Bid Opening Committee or any of the officials. |
| 29.4 | The bidders or bidder's authorized representatives who are present shall sign a bidder's attendance sheet evidencing their attendance. |
| 29.5 | First, envelopes marked as "WITHDRAWN" shall be read out and returned unopened to the Bidder. Next, envelopes marked "SUBSTITUTION" shall be opened and read out and exchanged with the corresponding Bid being substituted. The substituted Bid shall not be opened, but shall be returned to the Bidder. Envelopes marked "MODIFICATION" shall be opened and read out with the corresponding Bid. Only envelopes that are opened, read out and recorded at Bid Opening shall be considered. |
| 29.6 | All other envelopes shall be opened one at a time, and the following read out and recorded: the name of the Bidder and whether there is a modification; the Bid Prices (per lot if applicable), any discounts and alternative offers; the presence of a Bid Security, if required; and any other details as the Purchaser may consider appropriate. Only discounts and alternative offers read out and recorded at bid opening shall be considered for evaluation. No Bid shall be rejected at bid opening except for late bids, in accordance with ITB 27.1. |
| 29.7 | The Purchaser shall prepare a record of the Bid Opening, which shall include the information disclosed to those present in accordance with ITB 29.6. The minutes shall include, as a minimum: |
| | a. The Tender Number and Description; |
| | b. The name of the Bidder, Bid number and whether there is a withdrawal, substitution or modification; |
| | c. The Bid deadline date and time; |

| | | |
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| | d. | The date, time and place of Bid Opening; |
| | e. | Bid prices, per lot if applicable, offered by the Bidders, including any discounts and alternative offers; |
| | f. | The presence or absence of Bid Security and, if present, its amount; |
| | g. | The names of Bidders at the Bid Opening, and of the Bidders authorized representatives (if any); |
| | h. | Details of any feedbacks or other comments made by Bidders/Bidders authorized representatives attending the Bid Opening, including the names and signatures of the Bidders/Bidders authorized representatives making the feedback(s) and/or comment(s); and |
| | i. | The names, designations and signatures of the members of the Bid Opening Committee. |

# E. Evaluation and Comparison of Bids

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| **30.** | **Confidentiality** |
| 30.1 | Information relating to the examination, clarification, evaluation and comparison of Bids and recommendations for the award of a contract shall not be disclosed to Bidders or any other persons not officially concerned with such process. |
| 30.2 | Any effort by a Bidder to influence the Purchaser's processing of Bids or award decisions may result in the rejection of the bidder's Bid. |
| **31.** | **Clarification of Bids** |
| 31.1 | To assist in the examination, evaluation and comparison of Bids, the Purchaser may, at its discretion, ask the bidder for a clarification of its Bid. Any clarification submitted by a Bidder with regard to its Bid and that is not in response to a request by the Purchaser shall not be considered. The Purchaser's requests for clarification and the response shall be in writing. No change in the price or substances of the Bid shall be sought, offered or permitted, except to confirm the correction of arithmetic errors discovered by the Purchaser in the evaluation of the Bids, in accordance with ITB 34. |
| **32.** | **Deviations, Reservations, and Omissions** |
| 32.1 | During the evaluation of bids, the following definitions shall apply: |
| | a. "Deviation" is a departure from the requirements specified in the Bidding Document. Any comments, remarks, observations and feedbacks will constitute as deviation and shall be indicated in the deviation sheet; |

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| | b. | "Reservation" is the setting of limiting conditions or withholding from complete acceptance of the requirements specified in the Bidding Document; and |
| | c. | "Omission" is the failure to submit part or all of the information or documentation required in the Bidding Document. |

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| **33.** | **Responsiveness of Bids** | |
| | | |
| 33.1 | The Purchaser's determination of a Bid's responsiveness shall be based on the contents of the Bid itself, and is to determine which of the Bids received are responsive and thereafter to compare the responsive Bids against each other to select the lowest evaluated Bid. | |
| 33.2 | A substantially responsive Bid is one that conforms to all the terms, conditions and specifications of the Bidding Documents without material deviation, reservation or omission. A material deviation, reservation or omission is one that: | |
| | a. | Effects in any substantial way the scope, quality or performance of the supplies; or |
| | b. | Limits or is inconsistent with the bidding documents in a substantial way, the Purchaser's rights or the bidder's obligations under the Contract; or |
| | c. | Whose rectification would affect unfairly the competitive position of other Bidders presenting substantially responsive Bids. |
| 33.3 | If a Bid is not substantially responsive to the Bidding Documents, it shall be rejected by the Purchaser and may not subsequently be made responsive by the bidder by correction of the material deviation, reservation or omission. | |
| | | |
| **34.** | **Nonconformities, Errors and Omissions** | |
| | | |
| 34.1 | Provided that a Bid is substantially responsive, the Purchaser may waive any non-conformities or omissions in the Bid that do not constitute a material deviation. | |
| 34.2 | Provided that a Bid is substantially responsive, the Purchaser may request that the Bidder submit the necessary information or documentation within a reasonable period of time, to rectify nonmaterial nonconformities or omissions in the Bid related to documentation requirements. Such omission shall not be related to any aspect of the price of the Bid. Failure of the Bidder to comply with the request may result in the rejection of its Bid. | |
| 34.3 | Provided that the Bid is substantially responsive, the Purchaser shall correct arithmetical errors on the following basis: | |
| | a. | If there is a discrepancy between the unit price and the total price per item that is obtained by multiplying the unit price and quantity, the unit price shall |

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| | | prevail and the total price per item will be corrected unless in the opinion of the Purchaser there is an obvious misplacement of the decimal point in the unit price, in which case the total price as quoted shall govern and the unit price shall be corrected. |
| | b. | If there is a discrepancy between the Total Amount and the sum of the Total price per item, the sum of the total price per item shall prevail and the Total Amount will be corrected. |
| 34.4 | If the Bidder that submitted the lowest evaluated Bid does not accept the correction of errors, its Bid shall be disqualified and its Bid Security shall be forfeited. | |
| | | |
| **35.** | **Preliminary Examination of Bids** | |
| | | |
| 35.2 | The Purchaser shall examine and confirm that the following documents and information have been provided in the Bid. If any of these documents or information is missing, the Bid shall be rejected. | |
| | a. | Bid Form, in accordance with ITB 12.1 (a); |
| | b. | Price Schedules, in accordance with ITB 12.1 (a); |
| | c. | Bid Security, in accordance with ITB 22. |
| | | |
| **36.** | **Examination of Terms and Conditions; Technical Evaluation** | |
| | | |
| 36.1 | The Purchaser shall examine the Bid to confirm that all terms and conditions specified in the GCC and the SCC have been accepted by the Bidder without any material deviation or reservation. | |
| 36.2 | The Purchaser shall evaluate the technical features of the Bid submitted in accordance with ITB 20, to confirm that all requirements specified in Section V, Schedule of Supply of the Bidding Documents have been met without any material deviation or reservation. | |
| 36.3 | If, after the examination of the terms and conditions and the technical evaluation, the Purchaser determines that the Bid is not substantially responsive in accordance with ITB 33, the Bid shall be rejected. | |
| 36.4 | No conditional offer(s) shall be allowed. A bid with conditional offers shall be rejected | |
| | | |
| **37.** | **Conversion to Single Currency** | |
| | | |
| 37.1 | For evaluation and comparison purposes, the Purchaser shall convert all bid prices, expressed in amounts in various currencies into a single currency and use the exchange rates specified in the BDS. | |

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| **38.** | **Margin of Preference** | |
| 38.1 | A margin of preference may apply to domestic goods manufactured in Bhutan as provided for in the BDS. To avail a margin of preference, the Bidder shall provide a value addition certificate from the Ministry of Economic Affairs. | |
| **39.** | **Detail Evaluation of Bids** | |
| 39.1 | The Purchaser shall evaluate each Bid that has been determined, up to this stage of evaluation, to be substantially responsive. | |
| 39.2 | To evaluate a Bid, the Purchaser shall only use all the factors, methodologies and criteria defined in this ITB 39. No other criteria or methodology shall be permitted. | |
| 39.3 | To evaluate a Bid, the Purchaser shall consider the following: | |
| | a. | Evaluation shall be done for Items or Lots, as specified in the BDS; |
| | b. | The Bid Price, as quoted in accordance with ITB Clause 16; |
| | c. | Price adjustment for correction of arithmetic errors in accordance with ITB 34.3; |
| | d. | Price adjustment due to discounts offered in accordance with ITB Clause 16.4; |
| | e. | Adjustments due to the application of the evaluation criteria specified in the BDS from amongst those set out in Section III, Evaluation and Qualification Criteria; and |
| | f. | Adjustments due to the application of a margin of preference, in accordance with ITB Clause 38, if applicable. |
| 39.4 | The Purchaser's evaluation of a Bid shall exclude and not take into account any allowance for price adjustment during the period of execution of the contract, if provided in the bid. | |
| 39.5 | The Purchaser's evaluation of a Bid may require the consideration of other factors in addition to the Bid Price quoted in accordance with ITB Clause 16. These factors may be related to the characteristics, performance, and terms and conditions of purchase of the Goods and Related Services. The effect of the factors selected, if any, shall be expressed in monetary terms to facilitate comparison of Bids, unless otherwise specified in Section III, Evaluation and Qualification Criteria. The factors, criteria and the methodology of application shall be as specified in ITB 39.3 (e). | |
| 39.6 | If so specified in BDS, Goods are grouped in two or more lots, the Purchaser will evaluate Bids on the basis of LOT WISE or a combination of Lots and the Purchaser shall award one or multiple lots to more than one Bidder. | |

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| **40.** | **Comparison of Bids** |
| 40.1 | The Purchaser shall compare all substantially responsive Bids to determine the lowest evaluated Bid, in accordance with ITB 39. |
| 40.2 | If the Bid price of the lowest evaluated Bid appears abnormally low, high and/or seriously unbalanced price as compared to other Bidders or past rates, then the Purchaser may require the Bidder to produce written explanations of, justifications and detailed price analyses for any or all items offered. Such explanations may include, but are not limited to, details of the method by which the Goods and Related Services are to be provided, the technical solutions chosen, exceptionally favourable conditions available to the Bidder for the execution of the Contract, and the originality of the Goods proposed by the Bidder. After objective evaluation of the explanations, justifications and price analyses, if the Purchaser decides to accept the Bid with an abnormally low and/or seriously unbalanced price, the Purchaser shall require that the amount of the Performance Security stipulated in ITB 48 be increased at the expense of the Bidder to a level sufficient to protect the Purchaser against financial loss in the event of default of the successful Bidder under the Contract. |
| **41.** | **Post qualification of the Bidder** |
| 41.1 | The Purchaser will determine to its satisfaction whether the bidder selected as having submitted the lowest-evaluated and substantially responsive Bid is qualified to satisfactorily perform the Contract. |
| 41.2 | The Purchaser will determine the reasonability of the Bid Prices based on the past purchase rate and the prevailing market rate during the evaluation. |
| 41.3 | The determination based upon an examination of the documentary evidence of the bidder's qualifications submitted by the bidder, pursuant to ITB 19, as well as such other information as the Purchaser deems necessary and appropriate. |
| 41.4 | If required, the Purchase may carry out the inspections of the Bidder's factories to assess the production, technical, financial, and manpower capacity of the Bidder to perform the Contract. The Purchaser shall notify in advance of the date in writing on which the inspection will be made. If the Bidder does not meet the required capacity as assessed by the inspection team, the bid shall be rejected |
| 41.5 | An affirmative determination shall be a prerequisite for award of the Contract to the bidder. A negative determination will result in rejection of the bidder's Bid, in which event the Purchaser shall proceed to the next lowest evaluated Bid to make a similar determination of that Bidder's capabilities to perform satisfactorily. |
| **42.** | **Contacting the Purchaser** |
| 42.1 | Subject to ITB 31, no bidder shall contact the Purchaser on any matter relating to its Bid, from the time of bid opening to the time the Contract is awarded. |

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| 42.2 | Any effort by a Bidder to influence the Purchaser in the Purchaser's decisions in respect of bid evaluation, bid comparison or Contract awards will result in the rejection of the bidder's Bid. |
| **43.** | **Purchaser's Right to Accept Any Bid and to Reject Any or All Bids** |
| | |
| 43.1 | The Purchaser reserves the right to accept or reject any Bid and to annul the bidding process and reject all Bids at any time prior to award of Contract, without thereby incurring any liability to the affected bidder or bidders or any obligation to inform the affected bidder or bidders of the ground for the Purchaser's action. |

# F. Award of Contract

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| **44.** | **Award Criteria** |
| | |
| 44.1 | The Purchaser will award the Contract to the successful bidder whose Bid has been determined to be the lowest-evaluated responsive Bid, provided further that the bidder is determined to be qualified to satisfactorily perform the Contract. |
| **45.** | **Purchasers Right to Vary Quantities at Time of Award** |
| | |
| 45.1 | At the time the Contract is awarded, the Purchaser reserves the right to increase or decrease the quantity of Goods and Related Services specified in Section V, Schedule of Supply, provided this does not exceed the percentages indicated in the BDS, and without any change in the unit prices or other terms and conditions of the Bid. |
| **46.** | **Notification of Award** |
| | |
| 46.1 | The Purchaser will notify the successful bidder in writing that its Bid has been accepted. |
| 46.2 | Until a formal Contract is prepared and executed, the notification of award shall be binding on the Supplier. |
| **47.** | **Signing of Contract** |
| | |
| 47.1 | Within 15 (Fifteen) days from the date of issue of the notification of award of contract, the successful bidder are required to come and sign, date and seal the contract agreement at the office as specified in BDS. |
| 47.2 | Where the contract is not signed by both parties simultaneously: |
| | a. The Purchaser shall send to the successful bidder two original copies of (1) the full agreed contract and (2) the letter of acceptance, each copy to be signed by the bidder or its duly authorized representative, together with the date of signature; |

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| | b. | The letter of acceptance shall indicate the deadline by which it must be accepted as specified in BDS; |
| | c. | The successful bidder, if agrees to conclude the contract, must sign and date all original copies of the contract and letter of acceptance and return one copy of each to the Purchaser before the expiry of the deadline indicated in the letter of acceptance; |
| | d. | Failure of the successful bidder to accept the award/ sign the contract shall constitute sufficient grounds for the annulment of the award and forfeiture of the bid security. |
| 47.3 | Notwithstanding ITB 47.1 above, in case signing of the Contract Agreement is prevented by any export restrictions attributable to the Purchaser, to Bhutan, or to the use of the products/Goods, systems or services to be supplied, where such export restrictions arise from trade regulations from a country supplying those products/Goods, systems or services, the Bidder shall not be bound by its Bid, always provided, however, that the Bidder can demonstrate to the satisfaction of the Purchaser that signing of the Contact Agreement has not been prevented by any lack of diligence on the part of the Bidder in completing any formalities, including applying for permits, authorizations and/or licenses necessary for the export of the products/Goods, systems or services under the terms of the Contract. | |
| **48.** | **Performance Security** | |
| | | |
| 48.1 | Within 15 (Fifteen) working days of the receipt of notification of award of contract, the successful bidder shall furnish the performance security, in accordance with the Conditions of Contract. | |
| 48.2 | The Performance Security @10% of the supply contract value shall be furnished by the successful bidder in one of the following forms: | |
| | a. | Unconditional bank guarantee issued by the reputed Financial Institution in the form provided for in Section VIII, Contract Forms or another form acceptable to the Purchaser; or |
| | b. | Banker's Cheque/Cash Warrant, or |
| | c. | Demand Draft. |
| 48.3 | If the institution issuing the Performance Security furnished by the Bidder is located outside the Purchaser's country, the Performance Security shall be counter-guaranteed by a correspondent Financial Institutions located in the Purchaser's country to make it enforceable. | |

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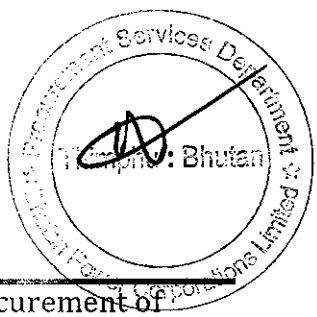
| 48.4 | Failure by the successful Bidder to submit the above-mentioned Performance Security shall constitute sufficient grounds for the annulment of the award and forfeiture of the Bid Security. In that event the Purchaser may award the Contract to the next lowest evaluated Bidder whose offer is substantially responsive and is determined by the Purchaser to be qualified to perform the Contract satisfactorily. Such a failure shall be considered as default and all relevant clauses shall apply. |



# Section II. Bid Data Sheet (BDS)

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| | **A. Introduction** |
| ITB 1.1 | The Tender No. is: *BPC/PSD/Tender/2021/13 dated 17th April, 2021* |
| ITB 1.1 | The Tender Name is: *Supply and Delivery of Electrical Materials* |
| ITB 1.1 | The Purchaser is: *Procurement Services Department, Bhutan Power Corporation Limited, Yarden Lam, Post Box No. 580, Thimphu, Bhutan.* |
| ITB 1.1 | The number and identification of Lots comprising this tender are: |

| | |
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| *Lot 1* | *ACSR Conductors* |
| *Lot 2* | *Distribution Pillar, Spike Earthing and Lightening Arrestor* |
| *Lot 3* | *Cable Jointing Kits* |
| *Lot 4* | *Transformer Oil* |
| *Lot 5* | *Lugs and Compression Glands* |
| *Lot 6* | *Battery Bank with charger* |
| *Lot 7* | *Miscellaneous* |
| *Lot 8* | *Auto Recloser Circuit Breaker* |
| *Lot 9* | *Distribution Transformer Meters* |
| *Lot 10* | *Numerical Relays* |
| *Lot 11* | *Sectionalizer* |

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| | **B. Bidding Documents** |
| ITB 8.2 | For **clarification of Bid purposes** only, the Purchaser's address is:<br><br>Attention: *The General Manager.*<br>Address: *Procurement Services Department, Bhutan Power Corporation Limited, Yarden Lam, Post Box No. 580, Thimphu, Bhutan.*<br>Telephone number: *+975-2-326289*<br>Electronic mail address: nim.dorji@bpc.bt |

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| | copy to:psdbpc@gmail.com/tsheringchoden16@bpc.bt |
| | **C. Preparation of Bids** |
| ITB 11.1 | The language of the Bid is: *English* |
| ITB 12.1(h) | The bidders shall submit a signed Integrity Pact: *Yes* |
| ITB12.1 (j) | The Bidder shall submit with its Bid the following additional documents: *None* |
| ITB 15.1 | Alternative Bids "*shall not be*" permitted. |
| ITB 16.5 | The Incoterms edition is: *2010 edition.* |
| 16.6 (a) (i) & (ii) | The price shall be inclusive of all taxes and duties that are applicable both inside and outside the purchaser's country. |
| ITB 16.6( b) (i) | The price of the goods quoted shall be DDP (Delivery duty paid), RSD, Malbase/Pasakha (Place of destination) for all the lots as per incoterm 2010. Notwithstanding any possible misinterpretation/ambiguity in interpretation, it is explicitly clarified that the offered prices shall be all inclusive covering all costs including but not limited to transportation, insurance, taxes and duties and any other costs for delivery of the materials to the Purchaser at the designated place of delivery/destination. |
| 16.6(b) (ii) | Add "The Price quoted shall be inclusive of all the taxes and duties that are payable inside as well as outside purchaser country". |
| ITB 16.6( b) (iii) | Final destination (Project Site) if relevant: Not Applicable. |
| ITB 16.7 | The prices quoted by the Bidder *"shall not"* be adjustable. |
| ITB 19 (a) | Manufacturer's Authorization (MA)"*is*" required |

| Lot Description | Remarks |
|---|---|
| *Lot 1: ACSR Conductors* | *YES* |
| *Lot 2: Distribution Pillar, Spike Earthing and Lightening Arrestor* | *YES* |
| *Lot 3: Cable Jointing Kits* | *YES* |
| *Lot 4: Transformer Oil* | *YES* |
| *Lot 5: Lugs and Compression Glands* | *NO* |

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|---|---|
| *Lot 6: Battery Bank with charger* | *YES* |
| *Lot 7: Miscellaneous* | *NO* |
| *Lot 8: Auto Recloser Circuit Breaker* | *YES* |
| *Lot 9: Distribution Transformer Meters* | *YES* |
| *Lot 10: Numerical Relays* | *YES* |
| *Lot 11: Sectionalizer* | *YES* |

a) ***The bid for that item(s)/Lot(s) shall be rejected if the Manufacturer's Authorization is not submitted for which the Manufacturer's Authorization is required.***

**b)** ***The Bidders are to mention the brand and origin of goods in the price schedule and submit the Manufacturer's Authorization accordingly. Item/Lots for which brands are restricted, no alternative/substitute brand shall be accepted and shall be considered as non-responsive for that particular item/lot.***

c) ***For items under lot no. 9 (Distribution Transformer Meters) and 10 (Numerical Relays) the brand is restricted. Items for which brand are restricted, no alternative/substitute brand shall be accepted and shall be considered as non-responsive for that particular items. The bidders are to mention only one brand against each items.***

ITB 19 (b) — After sales maintenance, repair, spare parts stocking and related services *"are not"* required, and the Bidder therefore *"is not"* required to be represented by a suitably equipped and able agent in Bhutan.

ITB 20.2 — Guaranteed Technical Particulars (GTP) *"is"* required.

| Lot Description | Remarks |
|---|---|
| *Lot 1: ACSR Conductors* | *YES* |
| *Lot 2: Distribution Pillar, Spike Earthing and Lightening Arrestor* | *YES except for Item No.3* |
| *Lot 3: Cable Jointing Kits* | *YES* |
| *Lot 4: Transformer Oil* | *YES* |
| *Lot 5: Lugs and Compression Glands* | *NO* |

| | |
|---|---|
| *Lot 6: Battery Bank with charger* | *NO* |
| *Lot 7: Miscellaneous* | *NO* |
| *Lot 8: Auto Recloser Circuit Breaker* | *YES* |
| *Lot 9: Distribution Transformer Meters* | *YES* |
| *Lot 10: Numerical Relays* | *YES* |
| *Lot 11: Sectionalizer* | *YES* |

a) ***The minimum technical specification (where ever required are detailed out under respective lot. Any technical deviation shall be brought out in the GTP forms for the items where GTP forms are provided and for the items where GTP forms are not required, the deviation shall be brought out in the deviation sheet provided. If the deviations are not mentioned in GTP and deviation sheet provided, the specification shall be considered as complied with the requirement.***

b) *The bid for that item(s)/Lot(s) shall be rejected if the GTP is not submitted as specified in Section V, Schedule of Supply where GTP Forms are provided for bidders to fill up. The bidders are required to duly fill up the GTP forms provided in the bidding document. The catalogue/brochures of the items shall not be considered as GTP of the item. Further, if there are discrepancies between the item catalogue/brochures and the offered GTP, then GTP shall prevail.*

c) *For the item(s)/Lot(s) of which GTP forms are not provided in Section V, Schedule of Supply of the bidding document, the bidders are requested to submit the catalogue or drawings for individual items. The offered items shall be clearly indicated in the catalogue and deviation brought out in deviation sheet provided.*

ITB 21.1 — The Bid validity period shall be *valid till* ***16th August 2021.***

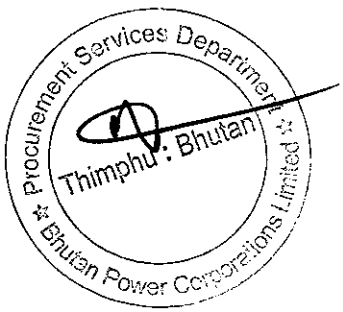
ITB 22.1 — The amount and currency of the Bid Security are as follows:

| Lot Description | Amount (Nu.) |
|---|---|
| *Lot 1: ACSR Conductors* | *34,653.00* |
| *Lot 2: Distribution Pillar, Spike Earthing and Lightening Arrestor* | *124,848.00* |
| *Lot 3: Cable Jointing Kits* | *29,749.00* |
| *Lot 4: Transformer Oil* | *28,526.00* |

| | | |
|---|---|---|
| | *Lot 5: Lugs and Compression Glands* | *31,000.00* |
| | *Lot 6: Battery Bank with Charger* | *9,845.00* |
| | *Lot 7: Miscellaneous* | *9,712.00* |
| | *Lot 8: Auto Recloser Circuit Breaker* | *102,120.00* |
| | *Lot 9: Distribution Transformer Meters* | *1,269,580.00* |
| | *Lot 10: Numerical Relays* | *190,565.00* |
| | *Lot 11: Sectionalizer* | *479,032.00* |
| | Preferably Bid Security should be submitted for the individual lots. Combined Bid Security would be also accepted. However, if the combined Bid Security is not sufficient in terms of total amount, the offer for the entire quoted lots would be treated as non-responsive as per ITB 22.4 and not considered for further evaluation. | |
| ITB 22.3 | **The Bid Security validity period shall be *valid till 15th September 2021.*** | |
| | **D. Submission and Opening of Bids** | |
| ITB 23.1 and 24.1 | In addition to the original of the Bid, the number of copies is: *One copy.* | |
| ITB 24.3 (d) | The identification of this bidding process is: *BPC/PSD/Tender/2021/13 dated 17th April, 2021.* | |
| ITB 25.1 | For **Bid submission purposes** only, the Purchaser's address is:<br>Attention: *The General Manager*<br>Address: *Procurement Services Department, Bhutan Power Corporation Limited, Yarden Lam, Post Box No. 580, Thimphu, Bhutan.* | |
| ITB 25.1 | The deadline for Bid submission is:<br>*Date: 18th May, 2021*<br>*Time: 13:00 hours* | |
| ITB 29.1 | The Bid opening shall take place at:<br>Address: *BPC Conference Hall, Bhutan Power Corporation Limited, Yarden Lam, Post Box No. 580, Thimphu, Bhutan.*<br>***Date: 18th May, 2021***<br>***Time: 14:30 hours*** | |

| | |
|---|---|
| | **E. Evaluation and Comparison of Bids** |
| ITB 37.1 | Bid prices expressed in different currencies shall be converted into Ngultrum (BTN).<br>The source of exchange rates shall be as published by the Royal Monetary Authority of Bhutan.<br>The date for the exchange rates shall be the date of Bid Opening, as prescribed in ITB 29.1 and the exchange rate shall be TT selling rate. |
| ITB 38.1 | A margin of five percent (5%) Domestic Preference *"shall not"* apply. |
| ITB 39.3 (a) | Bids will be evaluated as follows:<br>***Bid will be evaluated on lot wise basis. A lot with an alternative item price shall be rejected and that lot shall not be considered for further evaluation.***<br>In case some items are not quoted for a particular lot, the corporation reserves the right to cost load the highest responsive rate of other bidders for the purpose of evaluation of that lot if it was determined that the non-quoted items are not a major component of the lot or do not form an integral element of the lot. Actual order shall however be done based on the lowest rate that has been quoted in that bid package. |
| ITB 39.3 (e) | The adjustments shall be determined using the following criteria from amongst those set out in Section III, Evaluation and Qualification Criteria:<br>(a) Deviation in Delivery schedule: *Yes.[Clause 2.2 of Evaluation Criteria (ITB 39.3 (e)]*<br>(b) Deviation in payment schedule: *No [Clause 2.3 of Evaluation Criteria (ITB 39.3 (e) ]*<br>(c) The cost of major replacement components, mandatory spare parts, and service: *No. The cost of spare components, mandatory spares and services if submitted by the Bidder shall not be taken into consideration during the evaluation.*<br>(d) The availability in Bhutan of spare parts and after-sales services for the equipment offered in the Bid: *No*<br>(e) The projected operating and maintenance costs during the life of the equipment: *No.*<br>(f) The performance and productivity of the equipment offered: *Yes. The performance warranty period for the equipment offered will be 12 months from the date of receipt at the place of destination.* |

| | |
|---|---|
| ITB 39.6 | Bidders *"shall not"* be allowed to quote separate prices for one or more items/lots. *[refer to Section III, Evaluation and Qualification Criteria for the evaluation methodology, if appropriate]* |
| **F. Award of Contract** | |
| ITB 45.1 | The maximum percentage by which quantities may be increased is *20% percentage of the contract value.* The maximum percentage by which quantities may be decreased is *20% percentage of the contract value.* |
| ITB 47.1 | The signing of Contract Agreement will take place at:<br>Address: *Procurement Services Department, BPC, Yarden Lam, Post Box No. 580, Thimphu, Bhutan.* |
| ITB 47.2 | The letter of acceptance must be accepted on or before: 10 (ten) days after the notification of award. |



**Section III. Evaluation and Qualification Criteria**

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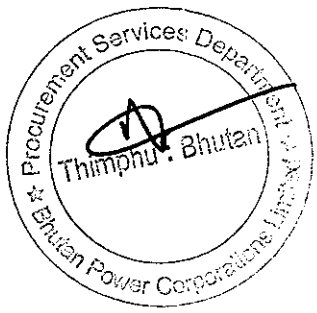


| | | |
|---|---|---|
| **Domestic Preference (ITB 38)** | | |
| | | |
| 1.1 | If the Bidding Data Sheet (BDS) so specifies, in comparing Bids, a margin of preference will be granted to Goods of Bhutanese Origin. | |
| 1.2 | For application of domestic preference, all responsive Bids will first be classified into the following three categories: | |
| | a. | *Category I:* Goods shall be considered to be of Bhutanese Origin based on the percentage of value addition as prescribed by the Ministry of Economic Affairs, Bhutan ; |
| | b. | *Category II:* All other bids offering Goods manufactured in Bhutan; |
| | c. | *Category III:* Bids offering Goods manufactured outside Bhutan that have been already imported or that will be imported. |
| 1.3 | In the first step, all evaluated bids in each group shall be compared to determine the lowest bid in each group. Such lowest evaluated bids shall be compared with each other and if, as a result of this comparison, a bid from Category I or Category II is the lowest, it shall be selected for the award. | |
| 1.4 | If as a result of preceding comparison, the lowest evaluated bid is a bid from Category III, for the purpose of further comparison only, an upward five percent (5%) price adjustment will be made to the CIF/CIP/DDP bid prices of Category III bidders. The lowest evaluated bid determined from this last comparison shall be selected for the award. | |
| 1.5 | Bidders applying for the preference shall provide all supporting documents to prove that the Goods offered by them are from Category I and Category II respectively. | |
| | | |
| **Evaluation Criteria (ITB 39.3 (e))** | | |
| | | |
| The Purchaser's evaluation of a Bid may take into account, in addition to the Bid Price quoted in accordance with ITB 16.6, one or more of the following factors as specified in ITB 39.3(e) and in the BDS referring to ITB 39.3(e), usingthe following criteria and methodologies. | | |
| 2.1 | Brand Name | |
| | BPC has adopted the policy of restricting certain Strategic Critical Items (SC-SKU's) as per the provision of the BPC Procurement Manual to ensure high quality, reduce inventory and to sustain long-term smooth operation and maintenance services. Bidders must ensure that for these lots, only the listed brand names are quoted and effort must be made to source this equipment directly from | |

| | | | |
|---|---|---|---|
| | the manufacturers and or their authorized dealers. Preferred Brands/Restricted Brands are specified in Price Schedule. | | |
| | | | |
| 2.2 | Delivery Schedule *(as per Incoterms specified in BDS)* | | |
| | The Goods are required to be delivered in accordance with and completed as specified in the Section V, Schedule of Supply. No credit will be given to earlier completion. Bids offering late delivery schedules (LDS) will be accepted but the Bids shall be adjusted for the purpose of the bid evaluation only adding at the rate of @one (1) per cent of the bid price for each week of delay to the bid price. Bids offering delivery schedules beyond 1 (one) month of the date specified in Section V, Schedule of Supply shall be rejected. | | |
| | | | |
| 2.3 | Adjustment for Deviations from the Terms of Payments | | |
| | Deviation from terms of payment as specified in special condition of contract shall not be permitted. All bids deviating from specified terms of payment will be treated as non-responsive. | | |
| 2.4 | Contractual and Commercial Deviations | | |
| | The cost of all quantifiable deviations and omissions from the contractual and commercial conditions shall be evaluated. The Purchaser will make its own assessment of the cost of any deviations for the purpose of ensuring fair comparison of Bids. | | |
| | | | |
| **3. Multiple Contracts (ITB 39.6)** | | | |
| | | | |
| 3.1 | The Purchaser shall award multiple contracts to the Bidder that offers the lowest evaluated combination of Bids (one contract per Bid) and meets the post qualification criteria (this Section III, Sub-Section ITB 39.2, Post qualification Requirements) | | |
| 3.2 | The Purchaser shall: | | |
| | a. | Evaluate only items/lots that include at least the percentages of items per lot and quantity per item as specified in ITB 16.8. | |
| | b. | Take into account: | |
| | | i. | the lowest-evaluated Bid for each lot; and |
| | | ii. | the price reduction per lot and the methodology for its application as offered by the Bidder in its Bid. |
| | | | |

| 4. Post qualification Requirements (ITB 41.2) | | |
|---|---|---|
| | | |
| 4.1 | After determining the lowest-evaluated Bid in accordance with ITB 40.1. If required, the Purchaser shall carry out the post qualification of the Bidder in accordance with ITB 41, using only the requirements specified. Requirements not included in the text below shall not be used in the evaluation of the Bidder's qualifications. | |
| | a. | Financial Capability<br><br>The Bidder shall furnish documentary evidence that it meets the following financial requirement(s): *NotApplicable.* |
| | b. | Experience and Technical Capacity<br><br>The Bidder shall furnish documentary evidence to demonstrate that it meets the following experience requirement(s): *ISO Certificate; list of previous clients, relevant catalogues, test certificates, list of past performance certificates and manufacturer's profile for all new brands that are introduced in BPC.* |
| | c. | The Bidder shall furnish documentary evidence to demonstrate that the Goods it offers meet the following usage requirement(s): *NotApplicable* |

## Section IV. Bidding Forms

## Table of Contents

# Bidder Information Form

*[The Bidder shall fill in this Form in accordance with the instructions indicated below. No alterations to its format shall be permitted and no substitutions shall be accepted.]*

Date: *[insert date of Bid submission: .....]*
Bid No.: *[.....]*

Page _____ of_ _____ pages

| |
|---|
| 1. Bidder's Legal Name: ..... |
| 2. In the case of a Joint Venture, Consortium or Association (JV/C/A) legal name of each party: ..... |
| 3. Bidder's actual or intended Country of Registration: ..... |
| 4. Bidder's Year of Registration: ..... |
| 5. Bidder's Legal Address in Country of Registration: ..... ..... |
| 6. Bidder's Authorized Representative Information<br>Name: .....<br>Address: .....<br>Telephone/Fax numbers: .....<br>E-mail Address: ..... |
| 7. Attached are copies of the following original documents: *[check the box(es) of the attached original documents]*<br>☐ Registration of firm named in 1 above, in accordance with ITB 3.1.<br>☐ In the case of a JV, letter of intent to form the JV, or the JV agreement, in accordance with ITB 6.1 (e).<br>☐ Power of attorney authorizing the signatory of the Bid to sign on behalf of the Bidder. |

## Joint Venture (JV) Partner Information Form

*[The Bidder shall fill in this Form in accordance with the instructions indicated below].*
Date: *[insert date (as day, month and year) of Bid submission]*
Bid No.: *[insert number of bidding process]*

Page _____ of_ _____ pages

| |
|---|
| 1. Bidder's Legal Name: *[insert Bidder's legal name]* |
| 2. JV Party's legal name: *[insert JV Party's legal name]* |
| 3. JV Party's Country of Registration: *[insert JV Party's country of registration]* |
| 4. JV Party's Year of Registration: *[insert JV Party's year of registration]* |
| 5. JV Party's Legal Address in Country of Registration: *[insert JV Party's legal address in country of registration]* |
| 6. JV Party's Authorized Representative Information<br>Name: *[insert name of JV Party's authorized representative]*<br>Address: *[insert address of JV Party's authorized representative]*<br>Telephone/Fax numbers: *[insert telephone/fax numbers of JV Party's authorized representative]*<br>E-mail Address: *[insert e-mail address of JV Party's authorized representative]* |
| 7. Attached are copies of the following original documents: *[check the box(es) of the attached original documents]*<br>☐ Articles of Incorporation or Registration of firm named in 2 above, in accordance with ITB 3.1.<br>☐ Copy of Agreement between JV Partners. |

## Bid Form

*[The Bidder shall fill in this form in accordance with the instructions indicated. No alterations to its format shall be permitted and no substitutions shall be accepted.]*

Date:..... *[insert date of Bid submission]*
Invitation for Bid No.:..... *[insert number of IFB]*

To: ..... *[insert complete name of the Purchaser]*
.....
.....

We, the undersigned, declare that:

(a) We have examined and have no reservations to the Bidding Documents, including Addenda No.:.....
.....*[insert the number and date of issue of each addendum]*;

(b) We offer to supply in conformity with the Bidding Documents and in accordance with the Delivery Schedules specified in the Schedule of Supply the following Goods and Related Services:.....
..... *[insert a brief description of the Goods and Related Services]*;

(c) The total price of our Bid, excluding any discounts offered in item (d) below is:
.....
.....*[insert the Bid Price in words and figures, indicating the various amounts and their respective currencies]*;

(d) The discounts offered and the methodology for their application are:

**Discounts.** If our Bid is accepted, the following discounts shall apply:.....
*[Specify in detail each discount offered and the specific item of the Schedule of Supply to which it applies.]*

**Methodology of Application of the Discounts.** The discounts shall be applied using the following methodology:.....
*[Specify in detail the methodology that shall be used to apply the discounts];*

(e) Our Bid shall be valid for a period of ***90 days (16th August 2021)*** from the date fixed for the Bid submission deadline in accordance with ITB (insert Sub-Clause21.1), and it shall remain binding upon us and may be accepted at any time before expiry of that period;

(f) If our Bid is accepted, we commit to provide a Performance Security in accordance with ITB (insert Clause 48 and GCC Clause 11) for the due performance of the Contract;

(g) We are not participating, as Bidders, in more than one Bid in this bidding process, other than any alternative offers submitted in accordance with ITB (insert Clause 15);

(h) We, including any subcontractors or suppliers for any part of the Contract, have nationality from eligible countries, viz:..... *[insert the nationality of the Bidder, including that of all parties that comprise the Bidder if the Bidder is a JV/C/A, and the nationality each subcontractor and supplier]*

(i) We have no conflict of interest pursuant to ITB (Insert Sub-Clause 3.2);

(j) Our firm, its affiliates or subsidiaries - including any subcontractors or suppliers for any part of the contract - has not been declared ineligible by the Purchaser under the laws or official regulations of Bhutan, in accordance with ITB (insert Sub-Clause 4.1);

(k) The following commissions, gratuities or fees have been paid or are to be paid with respect to the bidding process or execution of the Contract:..... *[insert complete name of each Recipient, its full address, the reason for which each commission or gratuity was paid and the amount and currency of each such commission or gratuity]*

| Name of Recipient | Address | Reason | Amount |
|---|---|---|---|
| _____ | _____ | _____ | _____ |
| _____ | _____ | _____ | _____ |

(If none has been paid or is to be paid, indicate "none.")

(l) We understand that this Bid, together with your written acceptance thereof included in your notification of award, shall constitute a binding contract between us, until a formal contract is prepared and executed.

(m) We understand that you are not bound to accept the lowest evaluated Bid or any other Bid that you may receive.

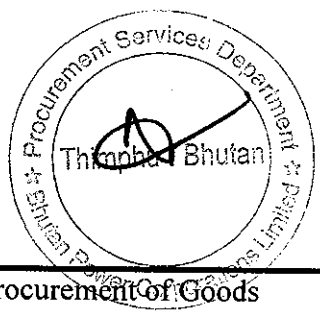
Signed: .....*[insert signature of person whose name and capacity are shown]*

In the capacity of ..... *[insert legal capacity of person signing the Bid Form]*

Name: .....*[insert complete name of person signing the Bid Form]*

Duly authorized to sign the bid for and on behalf of: ..... *[insert complete name of Bidder]*

Dated on ..... day of ....., .....*[insert date of signing]*



## DEVIATION SCHEDULE

The bidder shall specify below, in detail, all deviations from and exceptions to the Bid Document. Any entry shall be referenced to the Bid Document Clause No. To which they refer.

The Bidder shall be deemed to be complaint with the content and intent of the Bid Document except in respect of deviations and exception listed in this Schedule.

No deviation from and exception to the Bid Document shall be made subsequently to the Contract without the written approval of the Employer.

| Clause No. | Details of Deviation/ Exception | Reasons for Deviation/ Exception |
|---|---|---|
| | | |

Declaration: This page and attached.....Pages of deviation from the Bid Document is a complete record of such deviation.
In case of NO DEVIATION is mentioned here and deviation of clauses/specification is mentioned elsewhere, then it will be taken as a deviation.

Signature of Bidder _____

Place & Date _____

Procurement Services Department Thimphu : Bhutan Bhutan Power Corporation Limited

## Bid Security (Bank Guarantee)

*[The Bank shall fill in this Bank Guarantee Form in accordance with the instructions indicated.]*

_____

*[insert Bank's Name, and Address of Issuing Branch or Office]*

**Beneficiary:** _____ *[Name and Address of Purchaser]*

**Date:** _____

**BID GUARANTEE No.:** _____

We have been informed that _____ *[insert name of the Bidder]* (hereinafter called "the Bidder") has submitted to you its Bid dated (hereinafter called "the Bid") for the execution of *[insert name of Tender]* under Invitation for Bids No. _____ *[insert IFB number]* ("the IFB").

Furthermore, we understand that, according to your conditions, Bids must be supported by a Bid Guarantee.

At the request of the Bidder, we _____ *[insert name of Bank]* hereby irrevocably undertake to pay you any sum or sums not exceeding in total an amount of _____ *[insert amount in figures]* (*[insert amount in words]*) upon receipt by us of your first demand in writing accompanied by a written statement stating that the Bidder is in breach of its obligation(s) under the Bid conditions, because the Bidder:

(a) has withdrawn its Bid during the period of Bid validity specified by the Bidder in the Form of Bid; or

(b) having been notified of the acceptance of its Bid by the Purchaser during the period of Bid validity, (i) fails or refuses to execute the Contract ; or (ii) fails or refuses to furnish the Performance Security, if required, in accordance with the Instructions to Bidders.

This guarantee will expire: (a) if the Bidder is the successful Bidder, upon our receipt of copies of the contract signed by the Bidder and the Performance Security issued to you upon the instruction of the Bidder; or (b) if the Bidder is not the successful Bidder, upon the earlier of (i) our receipt of a copy of your notification to the Bidder of the name of the successful Bidder; or (ii) Thirty days after the expiration of the Bidder's Bid.

Consequently, any demand for payment under this guarantee must be received by us at this office on or before that date.

_____

*[signature of authorized representative of the bank]*

## Manufacturer's Authorization

*[The Bidder shall require the Manufacturer to fill in this Form in accordance with the instructions indicated. This letter of authorization should be on the letterhead of the Manufacturer and be signed by a person with the proper authority to sign documents that are binding on the Manufacturer. The Bidder shall include it in its bid, if so indicated in the* ***BDS.****]*

Date: _____ *[insert date of Bid Submission]*

Invitation for Bid No.: _____ *[insert IFB number]*
Alternative No.: _____ *[insert identification No if this is a Bid for an alternative]*

To: _____ *[insert complete name of the Purchaser]*

WHEREAS

We _____ *[insert complete name of the Manufacturer]*, who are official manufacturers of *[insert type of Goods manufactured]*, having factories _____ at *[insert full address(es) of the Manufacturer's factory/ies]*, do hereby authorize _____ *[insert complete name of Bidder]* to submit a Bid in relation to the Invitation for Bids indicated above, the purpose of which is to provide the following Goods, manufactured by us, namely _____ *[insert name and/or brief description of the Goods]*, and subsequently to negotiate and sign the Contract.

We hereby extend our full guarantee and warranty in accordance with the General Conditions of Contract, with respect to the Goods offered by the above firm.

Signed: *[insert signature(s) of authorized representative(s) of the Manufacturer]*

Name: *[insert complete name(s) of the authorized representative(s) of the Manufacturer]*

Title: *[insert title(s) of the authorized representative(s) of the Manufacturer]*

Duly authorized to sign this Authorization for and on behalf of *[insert complete name of the Bidder]*

Dated on the *[insert number]* day of *[insert month]*, *[insert year]*.

# INTEGRITY PACT

**1 General:**

Whereas *Nim Dorji, General Manager, Procurement Services Department* representing the *Bhutan Power Corporation Limited*, Royal Government of Bhutan, hereinafter referred to as the **"Employer"** on one part, and …… representing ……., hereinafter referred to as the **"Bidder"** on the other part hereby execute this agreement as follows:

This agreement shall be a part of the standard bidding document, which shall be signed by both the parties at the time of purchase of bidding documents and submitted along with the tender document.

**2 Objectives:**

Whereas, the Employer and the Bidder agree to enter into this agreement, hereinafter referred to as IP, to avoid all forms of corruption or deceptive practice by following a system that is fair, transparent and free from any influence/unprejudiced dealings in the **bidding process**[1] and **contract administration**[2], with a view to:

2.1 Enabling the Employer to obtain the desired contract at a reasonable and competitive price in conformity to the defined specifications of the works or goods or services; and

2.2 Enabling bidders to abstain from bribing or any corrupt practice in order to secure the contract by providing assurance to them that their competitors will also refrain from bribing and other corrupt practices.

**3. Scope:**

The validity of this IP shall cover the bidding process and contract administration period.

**4. Commitments of the Employer:**

The Employer Commits itself to the following:-

4.1 The Employer hereby undertakes that no officials of the Employer, connected directly or indirectly with the contract, will demand, take a promise for or accept, directly or through intermediaries, any bribe, consideration, gift, reward, favor or any material or immaterial benefit or any other advantage from the Bidder, either for themselves or for any person, organization or third party related to the contract in exchange for an advantage in the bidding process and contract administration.

[1] Bidding process, for the purpose of this IP, shall mean the procedures covering tendering process starting from bid preparation, bid submission, bid processing, and bid evaluation.

[2] Contract administration, for the purpose of this IP, shall mean contract award, contract implementation, un-authorized sub-contracting and contract handing/taking over.

4.2 The Employer further confirms that its officials shall not favor any prospective bidder in any form that could afford an undue advantage to that particular bidder in the bidding process and contract administration and will treat all Bidders alike.

4.3 Officials of the Employer, who may have observed or noticed or have reasonable suspicion shall report to the head of the employing agency or an appropriate government office any violation or attempted violation of clauses 4.1 and 4.2.

4.4 Following report on violation of clauses 4.1 and 4.2 by official (s), through any source, necessary disciplinary proceedings, or any other action as deemed fit, including criminal proceedings shall be initiated by the Employer and such a person shall be debarred from further dealings related to the bidding process and contract administration.

**5. Commitments of Bidders**

The Bidder commits himself/herself to take all measures necessary to prevent corrupt practices, unfair means and illegal activities during any stage of the bidding process and contract administration in order to secure the contract or in furtherance to secure it and in particular commits himself/herself to the following :-

5.1 The Bidder shall not offer, directly or through intermediaries, any bribe, gift, consideration, reward, favor, any material or immaterial benefit or other advantage, commission, fees, brokerage or inducement to any official of the Employer, connected directly or indirectly with the bidding process and contract administration, or to any person, organization or third party related to the contract in exchange for any advantage in the bidding process and contract administration.

5.2 The Bidder shall not collude with other parties interested in the contract to manipulate in whatsoever form or manner, the bidding process and contract administration.

5.3 If the bidder(s) have observed or noticed or have reasonable suspicion that the provisions of the IP have been violated by the procuring agency or other bidders, the bidder shall report such violations to the head of the procuring agency.

**6. Sanctions for Violation:**

The breach of any of the aforesaid provisions shall result in administrative charges or penal actions as per the relevant rules and laws.

6.1 The breach of the IP or commission of any offence (forgery, providing false information, mis-representation, providing false/fake documents, bid rigging, bid steering or coercion) by the Bidder, or any one employed by him, or acting on his/her behalf (whether with or without the knowledge of the Bidder), shall be dealt with as per the terms and conditions of the contract and other provisions of the relevant laws, including De-barment Rules.

6.2 The breach of the IP or commission of any offence by the officials of the procuring agency shall be dealt with as per the rules and laws of the land in vogue.

**7. Monitoring and Administration:**

7.1 The respective procuring agency shall be responsible for administration and monitoring of the IP as per the relevant laws.

7.2 The bidder shall have the right to appeal as per the arbitration mechanism contained in the relevant rules.

We, hereby declare that we have read and understood the clauses of this agreement and shall abide by it.

The parties hereby sign this Integrity Pact at _____ on _____.

Affix Legal Stamp

EMPLOYER

CID : 1 1 9 0 4 0 0 1 6 5 4

BIDDER/REPRESENTATIVE

CID : | | | | | | | | | | | |

Witness: _____

Name: Tshering Choden

CID : 1 0 7 0 5 0 0 3 4 4 9

Witness: _____

Name:

CID : | | | | | | | | | | | |

## VPMS Acceptance Form

*[The Bidder shall fill in this form in accordance with the instructions indicated. No alterations to its format shall be permitted and no substitutions shall be accepted.]*

WHEREAS MESSRS (Insert the name of bidder) _____
(hereinafter called "the Bidder") License No._____ having our registered office at_____ has submitted its bid dated _____.

We hereby agree to abide by the Vendor Performance Management System of BPC or do affirm as follows.

1. We have read and understood all provisions set in the Vendor Performance Management System (VPMS) and we have no reservations to the VPMS document included in the Bidding Documents.

2. We agree to abide by all the provision of VPMS.

3. If our bid is accepted, we agree to be assessed as per the vendor rating methodology adopted by Bhutan Power Corporation Limited.

4. Depending on our performance, we accept the rating of Vendor Performance Index issued and any action taken by Bhutan Power Corporation Limited pursuant to the VPMS.

5. We shall be liable for any breach of this undertaking and non- compliance to the provisions of VPMS.

(Signature of Bidder)

Date:

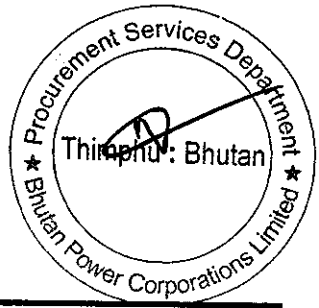
(Signature of witness)

Date:

Address:

Contact No.:

# PART 2- Supply Requirement

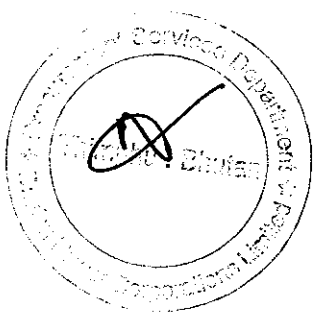


## 1. Delivery and Completion Schedule

a. The delivery period shall commence from the date of signing of the contract.

| Lot No. | Lot Description | Required Arrival Date of Goods or Completion Date for Related Services |
|---|---|---|
| Lot 1 | ACSR Conductors | 120 days from the date of signing of contract |
| Lot 2 | Distribution Pillar, Spike Earthing and Lightening Arrestor | 120 days from the date of signing of contract |
| Lot 3 | Cable Jointing Kits | 120 days from the date of signing of contract |
| Lot 4 | Transformer Oil | 90 days from the date of signing of contract |
| Lot 5 | Lugs and Compression Glands | 90 days from the date of signing of contract |
| Lot 6 | Battery Bank with charger | 90 days from the date of signing of contract |
| Lot 7 | Miscellaneous | 90 days from the date of signing of contract |
| Lot 8 | Auto Recloser Circuit Breaker | 60 days from the date of signing of contract |
| Lot 9 | Distribution Transformer Meters | 120 days from the date of signing of contract |
| Lot 10 | Numerical Relays | 60 days from the date of signing of contract |
| Lot 11 | Sectionalizer | 60 days from the date of signing of contract |

**Location / Destination as specified in BDS –Shall be RSD, Stores at Malbase, Pasakha, Phuentsholing**



## Section I - Common Technical Requirements

### 1.1 General

In the following sections, this document describes equipment required for the tender. The common technical specifications are to mainly state the general requirements commonly applied for all the Packages. **If there is any discrepancy in the requirements between the Common Technical Requirement and the Technical Specifications in this Section, the requirements mentioned in Technical Specifications shall prevail.**

### 1.2 Scope of Work

The supply contract includes the design, manufacture, testing, insurance, delivery in complete form (assembly at warehouse if required) unloading and proper handing over the supplies to the Purchaser's Warehouse at Phuentsholing/Pasakha, Bhutan, of the Equipment as specified in the Price Schedule.

All necessary foundation bolts, rag bolts, nuts and washers, grouting packing and the like required for mounting and securing the equipment/assemblies should be included in the supply.

Bidders shall furnish guaranteed technical particulars in the GTP Forms enclosed. Drawings of all components shall be provided together with the equipment type and reference number to ensure their identification.

The unloading of the goods (items) in the purchaser's warehouse shall be in the scope of the suppliers.

### 1.3 Units of Measurement

Metric units of measurement (System International) shall be used on all Contract documentation. Angular measurement shall be in degrees with 90 degrees comprising one right angle.

### 1.4 Standards

The design material, construction, manufacture, inspection and testing of all equipment supplied under this Specification shall conform to the latest editions of the International Electro-technical Commission (IEC) Specifications and other international standards where the material is not covered by IEC. Other national or international standards are accepted if they promise to confer equal or superior quality and performance than IEC or the specified standards.

The Supplier shall provide to the Purchaser, English language copies of any Standards and Codes of Practice, which the Supplier wishes to use. The Supplier shall provide English language translations of any Standards and Codes of Practice which the Supplier wishes to use and which are in a language other than English.

## 1.5 Language

The English language shall be used on all Contract documents, drawings and calculations and in all correspondence between the Supplier and the Purchaser. Any documents and drawings submitted by the Supplier in the language other than English to the Purchaser will be returned to the Supplier without review by the Purchaser.

## 1.6 Site Conditions

1.6.1 The conditions for the design of the equipment are as follow:

**Table 1**

| **Basic Design Parameters** | **Basic Design Value** |
|---|---|
| Altitude | 200 to 5000 meters |
| Ambient Air Temperature :<br>• Minimum<br>• Maximum | <br>-20°C<br>+40°C |
| Design ambient temperature | 40°C |
| Average Annual Rainfall | 1,400 mm |
| Climate | From tropical to severe winter |
| Relative Humidity | 20 % to 100 % |
| Isokeraunic Level | 75 thunderstorm days |
| Seismic Acceleration :<br>• Horizontal<br>• Vertical | 0.1 g<br>0.05 g |
| Snow Incidence in winter | 150 –300 mm |
| Wind Pressure :<br>• Conductors<br>• Supports | <br>0.44 kPa (45 kg/m$^2$<br>1.91 kPa (195 kg/m$^2$ |

*Note: There shall be specific requirement given in the tender specification where to use and install the equipment. If the altitude is not mentioned under the tender specification, the equipment under this tender shall be designed for 2500m and accordingly shall be altitude corrected to 2500m.*

## 1.7 Electrical Design Parameters

The electrical parameters of the equipment in accordance with relevant IEC and IS standards for 33kV and below are shown in following tables. The values mentioned below are for an altitude of 1000m.

**Table 2: Minimum insulation and short circuit withstand parameters- Medium voltage**

| **Nominal System Voltage** | **kV** | **33** | **11** | **6.6** |
|---|---|---|---|---|
| Nominal System Frequency | Hz | 50 | 50 | 50 |

| | | | | |
|---|---|---|---|---|
| Maximum System Voltage | kV | 36 | 12 | 7.2 |
| Rated Impulse withstand voltage (Peak) | kV | 170 | 75 | 60 |
| Rated one minute power frequency withstand voltage (rms) | kV | 70 | 28 | 20 |
| Rated one second short time current (rms) | kA | 16 | 20 | 20 |
| Rated short circuit withstand current (peak) | kA | 40 | 50 | 50 |
| Creepage Distance | (mm/kV) | 25 | 25 | 25 |

**Table 3: Insulation Parameters-Low Voltage**

Insulation parameters- Low Voltage

| **Nominal System Voltage** | **V** | **400/230** |
|---|---|---|
| Nominal System Frequency | Hz | 50 |
| Maximum System Voltage | V | 424/244[1] |
| Rated one minute power frequency withstand voltage (rms) | V | 3000 |
| Rated impulse withstand voltage (peak) | kA | 7500 |

*Note 1: Phase to Phase / Phase to Neutral*

**Table 4: System Variation**

| **Parameters permissible at 75 °C** | | **Variation** |
|---|---|---|
| Voltage Regulation of MV System | 33,11,6.6 kV | ±10% |
| Voltage Regulation of LV System | 400/230 V | ±6% |
| System Frequency | 50 Hz | -2%, +1% [1] |

Note 1: Maintain the System frequency between 49.0-50.5Hz.

### 1.7.1 De-rating

Since various standards or recommendations enforce validity limits on device characteristics, therefore the values mentioned in this specification are for the normal condition of use i.e. below 1000 m. Beyond these limits, it is necessary to deduce certain values, in other words to de-rate the device. De-rating must be considered;

- For insulation level of external insulation.
- For electrical clearances of two conductive parts measured through air.

### 1.7.2 Basic Insulation Level (BIL) De-rating According to Altitude

For installation at an altitude higher than 1000 m, the correction method recommended in IEC 60694 is convenient to use for purpose of the determination of withstand test voltages.

### 1.7.3 Electrical Clearance De-rating According to Altitude

If the equipment is specified for operation at an altitude higher than 1000 m, the clearance requirements shall be increased by 1.25% for every 100 m by which the altitude exceeds 1000 m.

Requirements are given for phase-to-earth; phase-to-neutral and phase-to-phase clearance.

## 1.8 Spare Parts, Tools and Appliances

The bidder shall attach the spares, special tools and/ or appliances which are recommended.

The Purchaser may order all, none or any of the recommended items. Those ordered shall be delivered not later than the date of receipt of the last shipment of the associated item of plant. The price of the items shall be subject to the same price conditions as the associated item of plant.

All spares shall be interchangeable with the original parts. They shall be treated and packed for long term storage under the climatic conditions of site.

Each item shall be clearly and permanently labeled on the outside of its container with its description and purpose. When several items are packed in one case, a general description of the contents shall be given on the outside of the case. Spare parts shall not be shipped in the same cases as components, which are used for erection. The cases shall be clearly labeled to indicate that they contain spare parts or tools and each tool or appliance shall be clearly marked with its size and purpose.

All case containers or other packages are liable to be opened for inspection and checking on site.

The cost of recommended spares, special tools (other than those specified in the BOQ) will not be taken into consideration when comparing bids.

## 1.9 Electrical Power Supplies

a) Power Supplies

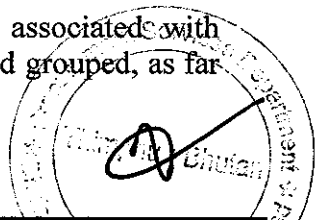
Power supplies for plant and equipment shall be:

i. 400 V, 3 phase, 4-wire, 50 Hz for power.
ii. 230 V, 1 phase, 50 Hz for lighting, indication, and anti-condensation heaters.

48/110 V DC for relays, essential indication, CB spring charging, controls/ protection, alarms, CB tripping and closing.

b) Miniature Circuit Breakers

Means shall be provided for protection and isolation of circuits associated with protection, control and instruments. They shall be of approved type and grouped, as far



as possible, according to their functions. They shall be clearly labeled both on the panels and the associated wiring diagrams.

Miniature circuit breakers shall be of the thermal and magnetic tripping type, and comply with IEC 60898 and IEC 60947-2.

c) Instruments

All electrical instruments and meters shall comply with IEC 60051 and IEC 61010 and, unless otherwise specified, shall be of industrial grade accuracy. Three-phase power measuring instruments shall be of the three-phase unbalanced load pattern wherever the current and Voltage references permit. Energy meters shall be three phase four wire having maximum demand indicator, RS485 port and optical port.

All indicating and recording instruments shall be flush mounted in dust proof cases complying with IEC 60068 and dimensions to IEC 61554.

The size of all indicating instruments shall be 96 mm square with long scale and instruments supplied from transducers shall have 4-20 mA movements. Running hour meters shall have 6 digit cyclo-meter type indicators.

Instrument dials shall be white with black markings. A red line shall be drawn on each scale to represent rated conditions. Bezels shall have uniform semi-gloss black high-grade finish.

The movements of all electrically actuated instruments shall be of the deadbeat type. Instruments shall be provided with a readily accessible zero adjustment wherever possible.

d) Terminals

Moulding materials shall be self-extinguishing or resistant to flame propagation, substantially non-hygroscopic and shall not carbonise when tested for tracking. The insulation between any terminal & framework or between adjacent terminals shall withstand a test of 2 kV rms. for one minute. The mouldings shall be mechanically robust to withstand handling while making terminations.

All terminals shall be mounted in accessible positions. Adjacent terminals shall be adequately spaced with respect to each other and to the incoming cable gland plate. Separate terminations shall be provided on each terminal strip for the cores of incoming and outgoing cables including all spare cores.

Terminal blocks for CT and VT secondary leads shall be provided with test links and isolating facilities. Terminals provided for current transformers shall incorporate facilities to enable secondary windings to be short-circuited without disturbing fixed wiring and earthing facilities.

Terminations for circuits operating at Voltages greater than 60 V shall be protected by transparent insulating covers marked with the working Voltages.

DC circuit terminals shall be segregated from AC terminals.

Unless otherwise specified, all the terminal blocks except the terminal blocks for CTs shall be suitable for connecting minimum two 2.5 sq.mm copper conductors of the external cables at each connecting point. The terminal blocks for CTs and PTs shall be suitable for connecting minimum of 4.0 sq. mm and 2.5 sq. mm copper conductors respectively.

All spare contacts and terminals of the panel mounted equipment and devices shall be wired to terminal blocks.

The terminal assemblies shall give the required number of ways plus 20% spare with a minimum of 5 terminals. These shall be uniformly distributed on all rows of terminal blocks.

e) Panel Wiring

All wiring shall be carried out with 1100 V grade, single core, stranded copper conductor wires with FRLS PVC insulation and shall be Vermin, rodent proof. The minimum size of the stranded copper conductor used for panel wiring shall be as follows:

a) All circuits except CT circuits : 1.5 mm2 per lead.
b) CT Circuit : 2.5 mm2 per lead.

The minimum number of strands per conductor shall be seven. Extra flexible wires shall be used for wiring of devices mounted on moving parts such as swinging panels and doors.

The wiring shall be bound and supported by clamping, roughing or lacing. Spiral wrapping will not be accepted. Wireways shall not be more than 50% full. Adequate slack wire shall be provided to allow for one re-stripping and reconnection at the end of each wire. When screened cables or wires are necessary, an insulating sheath shall be included.

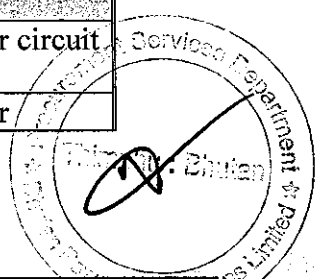
Wiring and supports shall be of fire resistant material.

Wiring shall only be jointed or teed at terminals. Terminals of the clamp type shall not have more than two wires connected.

f) Wire Colour Code

Wire colours shall be as follows:

| Colour | Purpose |
|---|---|
| Red | R-phase connections in current and Voltage transformer circuit only |
| Yellow | Y-phase connections in current and Voltage transformer |



| | |
|---|---|
| | circuits only |
| Blue | B-phase connections in current and Voltage transformer circuits only. |
| Green with Yellow Stripes | Connections to earth |
| Black | AC neutral connections, earthed or unearthed, connected to the secondary circuits of current and Voltage transformers. |
| Any other Colours | AC connections other than those above. |

Alternatively, where equipment is wired in accordance with a manufacturer's standard diagram, wiring may be carried out in a single colour except that all connections to earth shall be green with yellow stripes.

g) Terminations and Ferrules

The ends of every wire and every cable tail shall be fitted with numbered ferrules of white with alpha numbers clearly engraved in black.

Moisture and oil resisting insulating material shall be used. The ferrules shall be of the interlocking type and shall grip the insulation firmly.

Wires and terminals associated with tripping circuits shall be distinctively marked.

h) Electrical Insulation

Insulating materials shall be finished to prevent deterioration of their qualities under the specified working conditions.

Plastics, elastomers, resin-bonded laminates and inorganic materials shall be of suitable quality selected from the grades or types in the appropriate IEC Standard.

All cut or machined surfaces and edges of resin-bonded laminates shall be cleaned and then sealed with an approved Varnish as soon as possible after cutting.

i) Electronic and Control Equipment

Equipment shall be capable of withstanding randomly phased transient over-voltages of either polarity on the power supply or interruptions of the power supply without damage or impairment to the equipment's subsequent performance. In the case of controls, no mal-operation shall occur.

Where manufacturers require that electronic equipment supplied under this Contract should not be subjected to insulation resistance tests ("Meggering"), suitable warning notices shall be provided and installed in appropriate locations.

No thermionic valves shall be used in the equipment. Wherever possible, integrated circuits shall be used.

It shall be possible to remove/replace card from/to electronic equipment without damage and without interfering with the operation of the rest of the equipment or system. If necessary, consideration should be given to switching off the supplies locally to a card to prevent inadvertent interference to the equipment or system during removing/replacing a card.

j) Alternating Current Supply Practice

Double-pole switches shall be used to break single-phase ac mains supplies. For multi-phase supplies, each phase shall be switched simultaneously and the neutral should preferably not be switched. If it is switched, it shall be opened after and closed before the phase-lines.

All mains circuits shall be protected only in the phase-lines by MCBs of suitable rating or by other suitably approved protective devices. The neutral shall be connected by a removable link located near the protective devices.

All main transformers shall have an electrostatic screen, which shall be earthed.

k) Direct Current Supply Practice

Double pole switches shall be used to break dc supplies, one pole for the positive line and one pole for the negative.

DC circuits shall be protected by MCBs of suitable rating installed in both positive and negative lines.

Measures shall be taken to prevent arcing across switches or relay contacts which are required to break inductive circuits (e.g. bypass diodes or capacitors connected across coils).

Power supply bus bars in cubicles shall be shrouded.

The duplicate auxiliary power supply feeders shall be provided in Control panels. Auto-changeover facility in DC DB shall be provided so that in case of failure of one power source, other shall cut in automatically. The protective relays shall not give a trip signal for momentary loss of control Voltage or during changeover of control Voltage.

l) Batteries

Electronic equipment shall not use local internal batteries unless the approval has been obtained. Where approval is given, batteries used inside equipment shall be of the totally sealed, leak-proof type.

m) Earthing

Provision shall be made for earthing all equipment intended for connection in an ac mains supply.

All structural metal work and metal chassis shall be connected to earth. Earthing conductors shall be at least equal in cross-sectional area to the supply conductors and shall be capable of carrying the fault current for 1 second.

n) Anti-Condensation Heaters

Any items of electrical equipment which are liable to suffer from internal condensation (due to atmospheric or load variations) shall be fitted with heating devices suitable for electrical operation at 230 Volts ac, 1 phase, 50 Hz of sufficient capacity to raise the internal ambient temperature by 5°C. The electrical apparatus so protected shall be designed so that the maximum permitted rise in temperature is not exceeded if the heaters are energised while the apparatus is in operation. Where fitted, a suitable terminal box and control switch shall be provided and mounted in an accessible position. A thermostat shall be provided in the heater control circuit to cut-off the heater at 45° C.

o) Interior lighting and Receptacles

The panels shall be provided with a compact fluorescent lamp (CFL) lighting fixture (11 W) rated for 240 V, 1 phase, 50 Hz supply for the interior illumination of the panel during maintenance. Switching of the fitting shall be controlled by the respective panel door switch. All CFL lamps shall be with pin type holder.

The panels shall be provided with a 230 V, 1 phase, 50 Hz, 6 Amps, 3 Pin receptacle with switch. The receptacle with switch shall be mounted inside the panel at a convenient location.

## 1.10 Materials and Finishes

1.10.1 General

Unless otherwise provided for in the Contract, all materials, fixtures, fittings, and supplies furnished (hereafter called "materials") shall be new and of standard first grade quality. All assembly and construction work shall be done in a neat and professional manner. Materials shall be free of defects. Materials shall be brought to site only after inspection and issuance of proper dispatch clearance. The dispatch clearance shall be issued within three working days after the inspection from the BPC head office. The local materials like bricks, sand aggregates shall be tested in the local laboratories before bulk supply.

All of the plant, whether temporary or permanent, shall be in accordance with the Contract with respect to character, type, construction, constituent substances, weight, strength, shape, dimensions, etc.

In choosing materials and their finishes, due regard shall be given to the harsh climatic conditions which can occur in the area. Some relaxation of the following provisions may be permitted where equipment is hermetically sealed, but weatherproof materials should be used wherever possible.

All structural members, nuts and bolts shall be galvanised and shall conform to the requirements.

1.10.2 Surface Coating and Galvanising

All ferrous metalwork shall be provided with an effective galvanised or corrosion resistant paint treatment applied in accordance with the best trade practice. The paint treatment for each application shall be selected from the 'Paint Procedure' described in subsequent paragraphs.

The formulation and application procedure for the paint shall be as recommended by the manufacturer for the appropriate exposure conditions.

Coatings shall not be applied before vessels and chambers have passed any required pressure or vacuum tests. Precautions shall be taken to prevent corrosion occurring in the period of time between cleaning of the steel and commencing the painting.

Adequate amounts of each type and colour of finish coat as applied to the major equipment items shall be provided for "touch-up" purposes.

The colour of equipment shall be painted with RAL 7032 (exterior) and glossy white (interior).

1.10.3 Paint Procedure

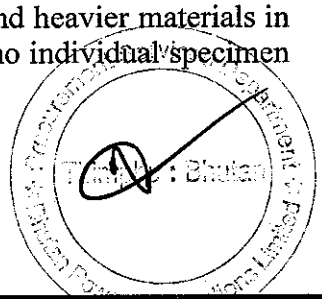
(a) For Mild Steel Items Exposed to Weather:
  (i) Blast clean.
  (ii) 1st coat - Inorganic zinc primer to give a dry film build of not less than 75 microns.
  (iii) 2nd coat - Chlorinated Rubber to give a dry film build of not less than 100 microns.
  (iv) 3rd coat - Chlorinated Rubber to give a dry film build of not less than 75 microns.

(b) Mild Steel Items Immersed in Oil :
  (i) Blast clean.
  (ii) 1st and 2nd coats - Epoxy paint treatment system in accordance with coating manufacturer's recommendation for oil immersion.
  (iii) Total dry film build thickness shall not be less than 350 microns.

1.10.4 Galvanising

Galvanising shall be applied by the hot dipped process generally in accordance with ASTM A 123-78 for structural steel and ASTM A 153-73 for iron and steel hardware.

For structural steel, galvanising shall average not less than 0.61 kg/m$^2$ (no individual specimen shall show less than 0.55 kg/m$^2$) except for 6.35 mm and heavier materials in which case galvanising shall average not less than 0.702 kg/m$^2$ (no individual specimen shall show less than 0.61 kg/m$^2$).



For iron and steel hardware, galvanising shall be in accordance with Table 1 of ASTM A 153-73.

The zinc coating shall be smooth, clean, of uniform thickness and free from defects. The preparation for galvanising and the galvanising itself shall not adversely affect the mechanical properties of the coated material.

1.10.5 Castings

All castings shall be free from blowholes, flaws and cracks as far as is practicable. No welding, filling or plugging of defective parts shall be done under any circumstances. All cast-iron shall be of close-grained quality approved by the Engineer.

1.10.6 Welding

All joints shall be bolted joints and welded joints shall not be permitted either during the design stage or the construction stage. However, during erection in case of additional unforeseen requirements by the Employer, if welding needs to be resorted to, the same shall be done with prior approval of the Engineer, and shall conform to BIS specifications. In such a case, the Contractor shall specifically indicate the location and purpose along with the proposed methodology for welding for the Engineers' approval. The wielding shall be carried out by a certified welder who have undergone minimum of certificate level training in this trade.

1.10.7 Nuts and Bolts

Nuts and bolts for incorporation in the plant shall conform to ISO Metric. Other sizes or threads may be permitted only for threaded parts not to be disturbed once manufacturing is complete. Each bolt shall have rolled threads, one hexagonal nut and two washers. Thread length shall be 50 percent of bolt length or maximum 150 mm.

All steel bolts and screwed rods shall be galvanised including the threaded portions. All associated nuts shall be galvanised with the exception of the threads which shall be oiled. The thickness of zinc coating shall be not less than 0.45 kg/sq. metre of surface area.

All bolts, nuts and washers shall be of non-corroding material where they are in contact with non-ferrous parts in conductor clamps and fittings and elsewhere where specifically required by the Purchaser.

## 1.11 Packing and Shipping

1.11.1 The goods/materials shall not be shipped/ dispatched unless dispatch clearance from Purchaser/Engineer is issued. The dispatch clearance will be issued from the BPCs office after the inspectors submits its inspection report to BPC, within 4 working days after the submission of the report.

1.11.2 Any items liable to be damaged in transit shall be effectively protected and securely fixed in their cases. All cases of over 2 tonnes shall be marked to show where slings should be placed.

1.11.3 All cases shall be clearly identified giving particulars of manufacturer's name and type of equipment. All identification marks on the outside of cases shall be waterproof and permanent. All electrical equipment shall be adequately sealed and desiccating agents used where necessary to prevent damage from condensation. All equipment shall be packed and protected, bearing in mind that it will be shipped to a harsh environment, that a considerable period may elapse between its arrival on site and it's unpacking and that covered storage may not always be possible.

1.11.4 All wood and other materials used in packing cases shall be insect free. Adequate protection and precautions are to be taken to exclude termites and other vermin, noxious insects, larvae or fungus from the packing materials or plant. All contents are to be clearly marked for easy identification against the packing list.

1.11.5 The Supplier shall protect all steelwork before shipment, to prevent corrosion and/ or damage. Bundles of steel sections shall be properly tied together by an approved method and care shall be taken to ensure that they are robust and that they can be handled easily during shipment.

1.11.6 Bolts and nuts shall be double bagged and crated for shipment. Crating of dissimilar metals is not acceptable.

1.11.7 Packing cases where used, shall be strongly constructed and in no case shall timber less than 25 mm in thickness be used. The contents of packing cases shall be securely bolted or fastened in position with struts or cross battens. Cross battens supporting weight in any direction shall not rely for their support on nails or screws driven lengthwise into the grain of the wood, but shall be supported by cleats secured from inside.

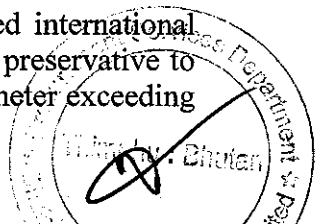
1.11.8 The following information shall be marked on the containers/cartons as well as boxes:

a) Supplier's name, Project title and Contract reference
b) Identification number
c) Net/Gross weight
d) Purchaser's name with other despatch particulars such as destination.

| Sl. No. | Description | Marking |
|---|---|---|
| 1 | Cables | Every 1 meter Consecutively |

### 1.12 Cable / Conductor Drums

1.12.1 HV Cables shall be supplied in a steel drum. The covers with wood is acceptable. LV Cables and bare conductors shall be wound on non-returnable seasoned wooden drums provided with lagging of adequate thickness and treated to an approved international standard by vacuum impregnation with copper-chrome-arsenate (CCA) preservative to resist rotting and termite and fungus attacks. Drums with an outside diameter exceeding



2.0 metres and an outside width exceeding 1.4 metres shall not be used. The central hole of the drums shall be reinforced with a steel plate of thickness not less than 10 mm, or be fitted with suitable steel hub bushing to suit an axle diameter of 95 mm.

1.12.2 The drums shall be new and sturdy in construction so as to withstand several times loading and unloading, transport on rough roads, storage for five (5) years in tropical areas and hauling and handling during field erection etc. In the event that the drums are received at the destination in damaged condition thereby, preventing rolling out of cable, the Supplier shall supply extra drums at his own cost. Also, the cost incurred by the Purchaser in rewinding the cable from the damaged drums onto the new drums will be deducted from the amount due to the Supplier.

1.12.3 Internal and external surfaces of the drum shall be painted with bitumen based paint. A layer of waterproof material shall be provided on the barrel under the cable and on the inner surfaces of the flanges. Another layer of waterproof material shall be provided over the outer layer of cable under lagging.

1.12.4 Drums shall be adequately protected by securely fastening substantial wooden battens around the periphery. These battens shall be secured by means of steel tap bindings.

1.12.5 Cables shall be securely fastened around the periphery of the drum. Cables shall be supplied with both ends properly capped, and protected against damage. Each drum and one of each cable length shall bear a metal label detailing manufacturer's name, specified voltage and type and length of conductor. The leading end of cable on cable drums shall be the 'A' end as defined in BS 6480.

1.12.6 The inner cable end attached to the drum shall be capped and sealed in such a manner that the core screening and sheath can be meggered from the outer cable end without removing the inner end cap.

### 1.13 Labels

1.13.1 All equipment shall be provided with labels or name plates, giving a description of the equipment, together with information regarding the rating, nominal voltage, nominal current and the like under which the item of plant in question has been designed to operate. The labels shall be provided on packaging to the Purchaser's approval.

1.13.2 Such nameplates or labels are to be of non-corrodible, non-hygroscopic material with lettering of a contrasting colour.

1.13.3 Labels on cable drums shall state the cable details, including the length in metres.

### 1.14 Locks

Provision shall be made for padlocking of mechanism boxes, isolators and outdoor switchgear as required by the Specification or as necessary to limit access or the safety of personnel. All padlocks will be provided by the Purchaser.

### 1.15 Supplier Documents and Drawings

1.15.1 General

The Supplier shall be responsible for submission, re-submission and obtaining approval as required of all the documents and drawings listed below (but not limited to), so that there shall be no delay to the work due to the absence of such documents and drawings. Any approval by the Purchaser will not relieve the Supplier of any obligations under the Contract.

Any alterations to the documents and drawings which may be required by the Purchaser for approval shall be made by the Supplier at his own expense. All materials and work involved in their manufacture shall be as indicated in such drawings.

No work shall be done on any part of the Goods, the design or construction of which is dependent on the approval of such drawings or data, until such approval has been given.

1.15.2 Manner of Submission and Approval of Drawings

The Supplier shall submit three prints of each drawing or document (including all the drawings, documents, calculations, manuals required under the Contract) for approval marked 'For Approval'. One copy will be returned to the Supplier marked up with approval or any proposed alterations or conditions. The Supplier shall provide the same number of further prints for any drawings that are altered. The submission of drawings for approval shall be repeated until 'Approved' or 'Approved with conditions' is given by the Purchaser.

Within fifteen working days after receipt by the Purchaser of any drawing or document requiring the Purchaser's approval, the Purchaser shall either return one copy thereof to the Supplier with its approval endorsed thereon or shall notify the Supplier in writing of its disapproval thereof and the reasons therefore and the modifications that the Purchaser proposes.

All drawings, information, design reports, etc shall be neatly type written and be presented as bound documents. The documents presented shall have neatly drawn title pages that clearly show the name of the Purchaser, identify the project name, the contract number, the date, the revision number, etc, and shall be provided with a table of contents.

1.15.3 Manuals

The Supplier shall submit the instruction manual for all the goods supplied under the contract. The Supplier shall follow the requirements as mentioned in the relevant clauses in the Technical Specifications.

### 1.16 Quality Assurance

1.16.1 The manufacturer must operate a quality assurance system that complies with ISO 9000. The Supplier shall provide current certification showing the manufacturers

compliance with ISO 9000 or equivalent national standard. The certificate must be issued by an independent, accredited issuing authority.

1.16.2 In compliance with the proposed quality assurance system of ISO 9000 or equivalent, Bidder shall submit with Bid the quality assurance plan for manufacturing the Goods. Especially, if the Bidder proposes to form a joint-venture or consortium, such a Bidder shall submit with Bid a quality assurance plan, including explanation how to manage the same quality of Goods by the joint-venture partners.

### 1.17 Tolerance

The variation in quantity to be supplied against confirmed order shall be permissible up to One (1) percent per item per consignee for delivery for only those materials whose units of measurement are in kilograms, litres, meters etc. However, for the short supply the payment shall be made as per the actual supply and for over supply the payment shall be limited to the ordered quantity.

### 1.18 Inspection and Testing

The materials will be inspected at the Manufacturer's works by the Purchaser's representative. Tests shall be performed in accordance with the relevant IEC standards. In the absence of IEC recommendations the tests must be equivalent at least to the conditions, provisions and definitions of the above-mentioned standards. The supplier shall give at least one month's notice for readiness of equipment for testing at the manufacturer's works. The tests shall be divided into the categories described below.

#### 1.18.1 Routine Tests

All the routine tests specified by the standards shall be carried out. If the tests are not witnessed by the Purchaser's representative, test certificates shall be submitted to the Purchaser for approval. Despatch clearance will be given only if the test results are approved.

#### 1.18.2 Type Tests

Bidder shall include with his bid type test certificates, issued by an approved, reputed, independent testing laboratory. The validity of type tests shall be) item specific as specified in Technical Specification under respective lots.

In addition, the Purchaser may call for type tests to be carried out at the Manufacturer's Works and to be witnessed by the Purchaser or his representative. Such tests will be on random samples at the discretion of the Purchaser and failure to meet the conditions of test could result in the rejection of a complete batch of equipment. Type testing shall only be performed if the manufacturer is unable to provide type test certificates issued by an independent test laboratory of international repute.

**Inspection**

The Supplier shall intimate the Purchaser about the detailed program about the tests and inspection at least one month in advance.

Inspection and tests on all the Goods offered shall be carried out in the presence of Purchaser's representative unless inspection waiver has been given to the Supplier. The inspection shall be carried out as per the test procedure that has been approved by the Purchaser. The Supplier shall assist the work of the Purchaser's inspector by providing copies of all relevant Standards and test procedures, and allowing the inspector full use of the necessary tapes, measures and laboratory equipment, together with ample space and assistance in the handling of Goods for inspection.

The Supplier shall submit all final test and inspection reports to Purchaser's representative (inspector) during his stay at the workshop for the inspection. The inspector shall issue a "Dispatch Clearance" to the Supplier when the tests and inspection has successfully completed in compliance with the Technical Specifications.

## 1.19 Dispatch Clearance

1.19.1 The Supplier shall submit all final test and inspection reports to Purchaser's representative (inspector) during his stay at the workshop for the inspection. The inspector shall issue a "Dispatch Clearance" to the Supplier when the tests and inspection has successfully completed in compliance with the Technical Specifications.

1.19.2 The goods have to reach to the delivery warehouse within Twenty (20) days from the date of issuance of dispatch clearance (if the goods are supplied/manufactured from India & Nepal).

1.19.3 The goods have to reach to the delivery warehouse within Forty Five (45) days from the date of issuance of dispatch clearance (if the goods are supplied/manufactured from Third Countries).

## Section – 2 Technical Requirements -Electrical

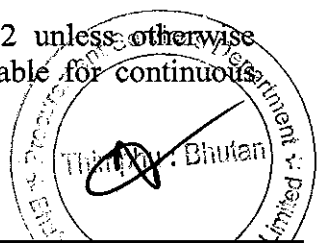
The following electrical technical requirements shall also apply to the equipment supplied under this Contract.

### 2.1 Electrical Supplies for Auxiliary Plant

The equipment provided under this Contract shall be capable of operating reliably at voltages down to 80% of the nominal voltage except where otherwise specified.

### 2.2 Electric Motors

2.2.1 All motors shall be in accordance with IEC 60034 and 60072 unless otherwise specified, shall be of the totally enclosed fan cooled type, suitable for continuous operation and direct on-line starting.



2.2.2 They shall be suitable in all respects for service in a damp tropical climate. Main conductor and slot insulation shall be non-hygroscopic and in accordance with Class F as per IEC 60085.

2.2.3 Motors to be located outdoor shall be entirely suitable for operation under the climatic conditions at site.

2.2.4 Motors shall be capable of operating continuously at rated output at any frequency between 48 and 51 Hz and at any voltage within ten percent of the nominal value. Motors shall be designed to be operated for a period of not less than five minutes at a voltage of 25% below the nominal value and at normal frequency without injurious overheating. If required by the purchaser, the supplier shall demonstrate that the motors comply with this requirement.

2.2.5 The starting current at full voltage shall not exceed six times the rated full load current.

2.2.6 All bearings shall be fitted with oil or grease lubricators. Vertical shaft motors shall have approved thrust bearings.

2.2.7 All terminals shall be of the stud type of adequate size for the particular duty, marked in accordance with an approved standard and enclosed in a weatherproof box.

2.2.8 All terminal boxes shall be fitted with an approved sealing chamber, conduit entry or adapter plate, as required, together with the necessary fittings to suit the type of cable specified.

**2.3 Starters and Contactors**

2.3.1 Where starters are to be provided under this Contract, each motor shall be equipped with two or three pole control gear as appropriate and suitable, unless otherwise specified, for direct starting by the switching of full line voltage on to a standing motor. All starters should preferably be supplied by one manufacturer.

2.3.2 Contactors are to be of robust design and are to comply with IEC 60947-4. They shall operate without undue noise or vibration.

2.3.3 Contactors shall be mounted in ventilated metal cubicles. Unless otherwise approved, the metal surface of the cubicle walls adjacent to the contactors shall be protected by fireproof insulating material. Where two or more contactors are contained in the same cubicle, they shall be separated by barriers of fireproof insulating material. The cubicles shall be complete with all locks, cable sealing boxes, busbars, internal wiring, terminal boards and accessories. All bare copper connections shall be taped and all secondary wiring is to be so arranged and protected as to prevent it being damaged due to arcing.

2.3.4 Starters shall be of the electrically held-in type with integral "start" and "stop" push buttons mounted externally on the door, with integral interlocked isolators. Where

required, auxiliary switches shall be included for the operation of "red" and "green" indicating lights in remote instrument panels.

2.3.5 All motor contactors and their associated apparatus must be designed to operate for a period of not less than 5 minutes at a voltage of 25% below the nominal value and at normal frequency without injurious overheating.

2.3.6 For circuits controlling motors of 15 kW and above, transformer operated overload and phase failure relays shall be provided. For controlling motors of less than 15 kW, thermal overload trips shall be acceptable.

## 2.4 Cables, Cable Boxes, Sealing End Chambers and Glands

2.4.1 This Contract includes power, auxiliary power and multi-core control cabling as specified in the appropriate sections of the Specification. All cables where required shall be fitted with approved cable end boxes or glands, complete with all necessary fittings.

2.4.2 Air filled cable boxes shall be of adequate dimensions and designed in such a manner that they can be opened for inspection without disturbing the gland plate or incoming cable. Disconnecting chamber shall be provided for disconnecting and moving away the transformer without unscaling the cables leaving the cable box or chamber.

2.4.3 Phase to phase and phase to ground clearances shall be subject to purchaser's approval.

2.4.4 Provision shall be made for earthing the body of each cable box.

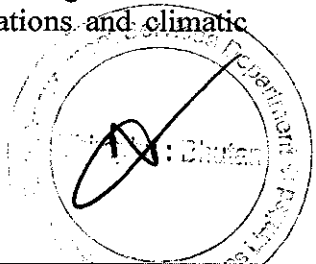
2.4.5 Corrosion protected brass material, compression type glands with armour and bonding clamps for the termination of all solid dielectric multi-core cables designed to secure the armour wires and to provide electrical continuity between the armour and the threaded fixing component of the gland and to provide watertight seals between the cable outer sheath and gland and between the inner sheath and threaded fixing component. The gland shall project above the gland plate to avoid ingress of condensed moisture.

2.4.6 All cable boxes shall have at least IP 54 degree of protection.

## 2.5 Electronic and Control Equipment

2.5.1 Component Ratings

Components and materials shall not be subjected to voltages; currents, temperature stresses, or any other condition outside the operational values given in the manufacturer's published data, over the range of temperature variations and climatic conditions indicated elsewhere.



Where circuits use components, which operate under unusual conditions, the Bidder shall produce documentary evidence that the life, stability and characteristics of the components used will be satisfactory.

Components which in their normal function may have full supply voltage applied shall be capable of withstanding continuous energisation.

2.5.2 Component Tolerances and Aging

The design of the circuits used shall be such that initial tolerances and also cyclic and non-cyclic changes in component values and parameters which may occur during the operational life of the equipment are either inconsequential or are compensated for.
Such compensation shall not necessitate the use of adjustable controls without the prior approval of the purchaser.
Standard components only shall be used and any individual selection necessary to obtain particular parameters shall be subject to the approval of the purchaser.
The combined effects of all tolerances, within a single component and between components, shall be allowed for by taking all tolerances in all worst case combinations produced by environmental and operating conditions. Other statistical assumptions that only certain combinations of tolerances will occur shall not be made, unless the relevant parameters involved are invariably interdependent.

2.5.3 Protection

All circuits shall be protected so that in the event of a component fault, no damage occurs to any interconnecting wiring and any other damage that does occur is confined as closely as possible to the fault.
Protective devices shall be so arranged that the risk of fire within the equipment be minimised. The greatest possible protection shall be provided, consistent with reliability and the ability to withstand operational conditions.
Power supply units' with/without stabilisers shall be protected with voltage trip and overload current circuits with an auto recovery feature.
If any protective device, such as MCB, is incorporated in the output circuits of a current-limited power supply unit, the available current under short circuit conditions shall be sufficient to operate them. MCBs shall be in the 'non-common side of the circuit.
Indication of trip of MCBs shall be clearly displaced by monitoring of trip. Circuits shall be grouped so that, following the operation of a protective device, no false operation shall occur as a result of an MCB trips.
The design, location and connections of MCB shall be such that they do not present a danger to the operator when it is in service.

2.5.4 Interference

a) Self-generated Interference

Equipment shall not generate any type of interference at a level which could be detrimental to the performance of any other equipment or which could cause annoyance or discomfort to personnel.

The earthing and cabling arrangements shall be such that detrimental interference is not generated.

b)External Interference

In the presence of interference expected in power station and substation environments, the design of the equipment shall be such that no damage occurs and performance is maintained to the requirements of the individual specifications.

c) Spark Quenching

Spark quenching devices shall be fitted wherever necessary to ensure continued satisfactory operation of contacts and prevent mal-operation of electronic devices.

d)Noise and Vibration

The acoustical noise levels and/or vibration produced by the equipment in operation shall be as low as is reasonably practicable for the type of equipment concerned and shall be agreed with the purchaser.

2.5.5 Setting-Up and Maintenance Facilities

All equipment shall be provided with sufficient easily accessible test points to facilitate setting-up and fault location together with maintenance aids such as extension boards, jumper leads and special maintenance tools.
Pin or terminal numbering of all cards in all crates shall be consistently uniform throughout. Power supplies shall use the same pin positions on all cards in an equipment or system.

2.5.6 Loose Equipment

Special connecting leads extension boards and any special item required for calibration or maintenance purposes, together with the mating half of all necessary connectors shall be supplied.

2.5.7 Printed Circuit Boards

Printed circuit boards shall be epoxy glass fabric boards to comply with IEC - 60321 suitable for use in hot humid climates. Printed circuit boards may be single-sided, double-sided or multi-layer.
Printed boards shall, in general, comply with IEC 60326. They shall not bow perceptibly when they are mounted in their shelves or racks. Means shall be provided to prevent boards being plugged into the wrong sockets and the plugging in/out action shall be arranged in a positive manner.
An approved protective coat shall be applied to the printed circuit side of the board to protect against tracking, tarnishing and general deterioration due to moisture and deposition of dust. The coating shall not have any adverse reaction with any other material or components used and shall be suitable for use under tropical conditions. When boards are repaired in the field it shall be possible to apply (or 'touch up') such a finish by simple convenient means.

2.5.8 Component Identification

a. A component reference number shall be marked adjacent to each component. Where this is impossible, components shall be identifiable from the layout drawings provided.

b. The following shall be marked in all instances:

MCBs

The rating and the circuit identification of each MCB shall be marked adjacent to the MCB base.

Control, Protection and Indication Devices

The function of each control, protection and indication device shall be marked. The caption and its arrangement shall be subject to the approval of the purchaser.

Preset Controls

The circuit reference and if possible, the function shall be marked adjacent to each preset control in a position where it will be clearly visible while the adjustment is being made.

Connectors

The diagram reference number shall be marked on or adjacent to each connector.

Test points shall be individually marked with the diagram reference number.

The polarity of any polarised devices (e.g. diodes) shall be marked.

## Section – 3 Technical Requirements - Mechanical

The following mechanical general technical requirements shall apply to equipment supplied under this Contract.

### 3.1 Pipe Supports

3.1.1 The whole of the pipework and accessories included in this Contract shall be supported and mounted in an approved manner. All necessary saddles, structural steelwork, foundation bolts, fixing bolts and all other attachments shall be supplied.

3.1.2 The number and positions of all intermediate flexible supports between anchor points shall be determined by the weights to be carried and by the steelwork available for the purpose and will be subject to the approval of the purchaser.

### 3.2 Valves

3.2.1 Valves shall be arranged so that the hand wheel moves in a clockwise direction to close the valve. The face of each hand wheel shall be clearly marked with the works "open" and "shut" and be provided with an arrow to indicate direction for opening and shutting. As far as possible valves shall not be fitted in an inverted position.

3.2.2 It shall be possible to remove and replace, or recondition in situ, the seats and to remove the gates. Valves of 50-mm nominal bore and above shall be provided with valve position indicators showing the amount by which the valve is open or closed in relation to its full travel.

3.2.3 All valve hand wheels shall be fitted with nameplates.

3.2.4 Suitable means shall be provided to protect the operating mechanisms of all valves against mechanical damage and dust or dirt. Adequate provision shall be made for the lubrication of the mechanism and guides and this shall preferably be of the pressure type.

3.2.5 Where it will be necessary to lock valves in the open or closed position, they shall be provided with a non-detachable locking arrangement.

### 3.3 Oil Level Indicators

3.3.1 Unless otherwise approved, oil level indicators of approved design shall be fitted to all oil containers other than hermetically sealed items.

3.3.2 The indicators shall show the level at all temperatures 'likely to be experience in service, be marked with the normal level at 20°C clearly visible from normal access levels and be easily dismantled for cleaning.

### 3.4 Pressure Gauges

3.4.1 All pressure gauges shall be fitted with stopcocks immediately adjacent to each gauge and all pressure gauge piping shall be fitted with an isolating valve at each point of connection to the main system. Where pressure gauges are mounted on panels, the stopcocks shall be suitable for the connection of a test gauge.

3.4.2 Where a difference in level exists between the situation of the gauge and the point at which pressure is to be measured, appropriate compensation shall be made in the dial reading and the dial must be marked with the amount of compensation applied. Where the compensation would amount to two percent or less of the total movement indicated under normal conditions, it may be ignored.

3.4.3 All pressure gauges where practicable shall be mounted on panels in locations approved by the Purchaser. Stopcocks of gauges must be readily accessible. All pressure gauges shall be clearly identified by means of separate labels of approved type and lettering.

3.4.4 All high pressure gauge piping shall be of rust less steel but other pressure gauge piping may be of copper tube or other material approved by the purchaser.

### 3.5 Thermometer Pockets

3.5.1 Thermometer pockets and instruments connections of an approved pattern are to be fitted in such a position as may be determined to suit the operation and testing of the plant to the approval of the purchaser. Where necessary, the pocket shall be of approved material suitable for the required service.

3.5.2 All thermometer pockets shall comply with the requirements of BS 2765 or equivalent Indian standard.

## Test Standards

### 1. Standards

The design material, construction, manufacture, inspection and testing of all equipment supplied under this Specification shall conform to the latest editions of the International Electrotechnical Commission (IEC) Specifications and other international standards where the material is not covered by IEC. Other national or international standards are accepted if they promise to confer equal or superior quality and performance than IEC or the specified standards.

### 2. Testing

The tests shall be divided into the categories described below.

### 2.1 Routine Tests

All the routine tests specified by the standards shall be carried out. If the tests are not witnessed by the Purchaser's representatives, test certificates shall be submitted to the Purchaser for approval. The test certificates must show the actual values obtained from the tests, in the units used in this Specification, and not merely confirm that the requirements have been met. No materials shall be dispatched until the test certificates have been received by the Purchaser and the Supplier has been informed that they are acceptable.

Despatch clearance will be given only if the test results are approved.

### 2.2 Type Tests

Bidder shall include with his bid type test certificates, issued by an approved, reputed, independent testing laboratory. **The type tests validity shall be item specific as mentioned in the technical specification under respective lot**. Type tests shall be carried out at an independent testing laboratory or be witnessed by a representative of such laboratory or some other representative acceptable to the Purchaser. Type tests may be dispensed with at the Purchaser's discretion, if the Supplier furnishes evidence to the Purchaser's satisfaction, that the relevant tests have already been performed on identical materials and equipment.

In addition, the Purchaser may call for type tests to be carried out at the Manufacturer's Works and to be witnessed by the Purchaser or his representatives. Type testing shall only be performed if the manufacturer is unable to provide type test certificates issued by an independent test laboratory of international repute. Such tests will be on random samples at the discretion of the Purchaser and failure to meet the conditions of test could result in the rejection of a complete batch of equipment.

**3. Inspection and Testing for Overhead Line, Switching Equipment, Surge Arresters, HV & LV Circuit Breakers**

Tests to establish whether the performance guarantees in the Schedules have been met shall be carried out by the Contractor, to the satisfaction of the Purchaser.

Type and routine factory tests shall comprise the following:

- Insulation level tests, including withstand tests at power frequency voltages on auxiliary equipment.
- Temperature rise test.
- Rated peak withstand current and rated short-time withstand current tests.
- Tests to prove satisfactory operation and mechanical endurance.

**4. Inspection and Testing for Distribution Pillar**

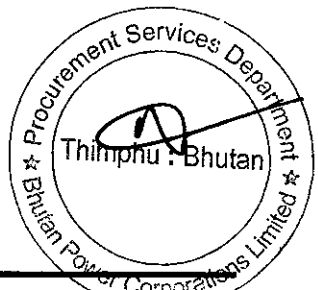
The Distribution Pillar shall be subject to following tests:

- High voltage test (2000V for 1 minute)
- Megger test
- Electrical control, interlocking and sequential operation test.

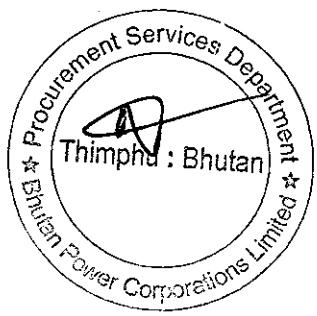
**5. Inspection and Testing for ACSR Conductor**

Testing to be conducted in accordance with IS-398:

- Measurement of length, weight, diameter, lay ratio;
- Testing for breaking load, uniformity of zinc coating and resistance in Ω/km at 20°C.
- Ductility test and Wrapping test
- Dip Test – samples subjected to 40 nos. one minute dip in copper sulphate solution as per IS 2633 (no copper deposit should be found)



# Technical Specification for Lot No. 1 (ACSR Conductors)



## 1.0 General

### 1.1 Scope of Supply

This section covers the requirements for the design, manufacture, testing, delivery and unloading at BPC stores of overhead ACSR conductors.

### 1.2 Standards

The latest edition of the international standards shall apply, in particular:

- BS 215 Aluminium conductors steel reinforced for overhead power transmission
- IEC 888 Zinc coated steel wires for stranded conductors
- IEC 889 Hard drawn aluminium wire for overhead line conductors
- IEC 1089 Round wire concentric lay overhead electrical stranded conductors

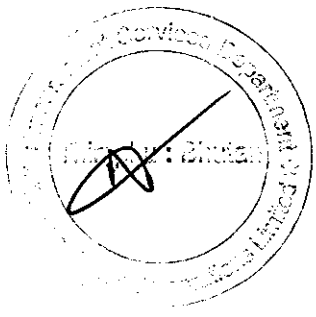
### 1.3 **ACSR Conductor**

#### 1.3.1 General

Bare aluminium conductors, steel reinforced (ACSR) are proposed to be used for MV overhead distribution lines. ACSR conductor consists of seven or more aluminium and galvanized steel wires built up in concentric layers. The centre wire is of galvanized steel and the outer layer is of aluminium as per IS: 398 (Part II).

#### 1.3.2 Construction

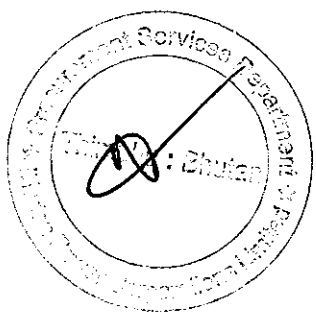
Construction of conductors shall be as per BS 215. The sizes and properties of the ACSR conductors shall be as given in the table below. The code names given are only for the purpose of easy identification. Conductors with equivalent or superior parameters to those specified herein will be considered acceptable. However, no credit will be given for the same.



| Sl. | Technical Particulars: | | |
|---|---|---|---|
| **1.** | **Type of conductor** | : | **ACSR Zebra Conductor.** |
| 2. | Applicable standards | : | IS – 398/ IEC 1089, IEC 888, IEC 189. |
| **3.** | **Nominal area of aluminum** | **:** | **420 Sq.mm.** |
| 4. | Sectional area of aluminum | : | 428.90 Sq.mm. |
| 5. | Total sectional area of aluminum | : | 484.50 Sq.mm. |
| 6. | Number of stranding and wire diameter | : | |
| | a. Aluminum | : | 54/3.18 mm. |
| | b. Steel | : | 7/3.18 mm. |
| 7. | Overall diameter of Al + Steel | : | 28.62 mm. |
| 8. | Weight mass of ACSR conductor | : | |
| | a. Overall weight | : | 1621 Kg/Km. |
| | b. Weight of Aluminum | : | 1182 Kg/Km. |
| | c. Weight of steel | : | 439 Kg/Km. |
| **9.** | **Calculated resistance at 20°C (maximum.)** | **:** | **0.06915 Ohms/Km.** |
| 10. | Ultimate tensile strength (minimum). | : | 121.45 kN. |
| 11. | **Conductor current carrying capacities** | **:** | |
| | a. Current carrying at 65°C. | : | 590.00 Amps. (Approx.) |
| | b. Current carrying at 75°C. | : | 737.00 Amps. (Approx.) |
| 12. | **Joints in strands** | **:** | |
| | a. Steel. | : | Not permitted. |
| | b. Aluminum wires. | : | No joint shall be permitted in the Aluminum wires in outer most layer of ACSR conductor. But permitted in the inner layer such that no two such joints are within 15 meters of each other in the complete stranded conductor. |
| 13. | Materials for construction of ACSR conductor. | : | The conductor shall be constructed of hard-drawn aluminum and aluminized steel wires as per above applicable IS & IEC standards. |

Procurement Services Department ☆ Thimphu : Bhutan ☆ Bhutan Power Corporation Limited

| | | | |
|---|---|---|---|
| **1.** | **Type of conductor** | : | **ACSR Panther Conductor.** |
| 2. | Applicable standards | : | IS – 398/ IEC 1089, IEC 888, IEC 189. |
| **3.** | **Nominal area of aluminum** | **:** | **200 Sq.mm.** |
| 4. | Sectional area of aluminum | : | 212.10 Sq.mm. |
| 5. | Total sectional area of aluminum | : | 261.50 Sq.mm. |
| 6. | Number of stranding and wire diameter | : | |
| | a. Aluminum | : | 30/3.00 mm. |
| | b. Steel | : | 7/3.00 mm. |
| 7. | Overall diameter of Al + Steel | : | 21 mm. |
| 8. | Weight mass of ACSR conductor | : | |
| | a. Overall weight | : | 976.00 Kg/Km. |
| | b. Weight of Aluminum | : | 588.50 Kg/Km. |
| | c. Weight of steel | : | 387.50 Kg/Km. |
| **9.** | **Calculated resistance at 20°C (maximum.)** | **:** | **0.1400 Ohms/Km.** |
| 10. | Ultimate tensile strength (minimum). | : | 86.58 kN. |
| 11. | **Conductor current carrying capacities** | **:** | |
| | a. Current carrying at 65°C. | : | 395 Amps. (Approx.) |
| | b. Current carrying at 75°C. | : | 487 Amps. (Approx.) |
| 12. | **Joints in strands** | **:** | |
| | a. Steel. | : | Not permitted. |
| | b. Aluminum wires. | : | No joint shall be permitted in the Aluminum wires in outer most layer of ACSR conductor. But permitted in the inner layer such that no two such joints are within 15 meters of each other in the complete stranded conductor. |
| 13. | Materials for construction of ACSR conductor. | : | The conductor shall be constructed of hard-drawn aluminum and aluminized steel wires as per above applicable IS & IEC standards. |



| | | | |
|---|---|---|---|
| **1.** | **Type of conductor** | : | **ACSR Wolf Conductor.** |
| 2. | Applicable standards | : | IS – 398/ IEC 1089, IEC 888, IEC 189. |
| **3.** | **Nominal area of aluminum** | **:** | **150 Sq.mm.** |
| 4. | Sectional area of aluminum | : | 158.10 Sq.mm. |
| 5. | Total sectional area of aluminum | : | 194.90 Sq.mm. |
| 6. | Number of stranding and wire diameter | : | |
| | a. Aluminum | : | 30/2.59mm. |
| | b. Steel | : | 7/2.59mm. |
| 7. | Overall diameter of Al + Steel | : | 18.13mm. |
| 8. | Weight mass of ACSR conductor | : | |
| | a. Overall weight | : | 727kg/km. |
| | b. Weight of Aluminum | : | 438kg/km. |
| | c. Weight of steel | : | 289kg/km. |
| **9.** | **Calculated resistance at 20°C (maximum.)** | **:** | **0.1871Ohms/km.** |
| 10. | Ultimate tensile strength (minimum). | : | 67.34kN. |
| 11. | **Conductor current carrying capacities** | **:** | |
| | a. Current carrying at 65°C. | : | 329Amps. (Approx.) |
| | b. Current carrying at 75°C. | : | 405Amps. (Approx.) |
| 12. | **Joints in strands** | **:** | |
| | a. Steel. | : | Not permitted. |
| | b. Aluminum wires. | : | No joint shall be permitted in the Aluminum wires in outer most layer of ACSR conductor. But permitted in the inner layer such that no two such joints are within 15 meters of each other in the complete stranded conductor. |
| 13. | Materials for construction of ACSR conductor. | : | The conductor shall be constructed of hard-drawn aluminum and aluminized steel wires as per above applicable IS & IEC standards. |

**1.4 Galvanizing**

The zinc content in the slab zinc and the method of zinc coating shall be as per IEC standards.

The mass of zinc coating shall correspond to Class 1 of IEC 888.

## 1.5 Greasing

The steel cores and the inner layers of aluminium wires (where more than one aluminium layer exists) shall be protected with special grease in order to provide additional protection against corrosion. The grease shall fill the whole space between wires within circumscribed cylinder at inner aluminium layer or at steel core, if the conductor has only one aluminium layer. The application of grease shall correspond to Case 1 of IEC 1089.

The grease shall be chemically neutral with respect to aluminium, zinc and steel. It shall withstand severe weather conditions prevailing in Bhutan and a temperature of 85°C continuously without alteration of its properties. It shall have a drop point of not less than 120°C.

## 1.6 Conductor Drums

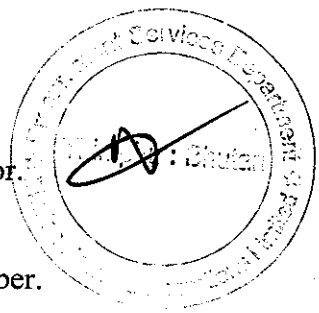
Conductors shall be supplied on drums in one continuous length. Maximum length of conductor on each drum shall be 4500 m for Rabbit and 2500 m for Dog and 2000 m for Wolf conductor.

The conductor shall be supplied on non-returnable wooden drum generally conforming to IS: 1778-1961 except where otherwise specified hereafter.

After reeling the conductor, the exposed surface of the outer layer of the conductor shall be wrapped with plastic sheet to protect the conductor from dirt, grit and damaged during transport and handling.

The wooden drums should be treated to an approved international standard by vacuum impregnation with copper-chrome-arsenate (CCA) preservative to resist rotting and termite and fungus attacks. The interior of the drums shall be lined with bituminous paper to prevent the conductor from being in contact with the timber. Drums shall be adequately protected by securely fastening substantial wooden battens around the periphery. These battens shall be secured by means of steel tap bindings. The drums shall be of seasonal hardwood strong enough and provided with lagging of adequate thickness and strength constructed to protect the conductor against all damages and displacement during transit, storage and subsequent handling at site. Spindle plates to be mounted/fixed on all the conductor drums offered. The conductor ends shall be properly sealed and secured with the help of U-nails or bolts on side of the flanges to avoid loosening of the conductors during transit handling. Each drum shall have the following information stencilled on it in indelible ink:

a. Contract/specification No.
b. Name and address of the consignee
c. Makers name and address
d. Drum No.
e. Size of conductor, code name and length of conductor in mtr.
f. Gross weight of the drum with protective lagging including conductor.
g. Weight of the empty drum with protective lagging.
h. Net weight of the conductor.
i. Arrow marking of unwinding position of the conductor end, lot number.



### 1.7 Type Tests & Test Certificates

ACSR Conductors shall be type tested for all the type tests as per applicable standard in an accredited lab within last 5 years from the date of bid opening.

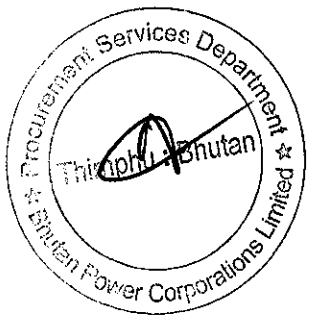
| GTP For Bidders to Fill up | | | | | |
|---|---|---|---|---|---|
| **LOT 1 : ACSR Conductor** | | | | | |
| **Sl. No.** | **Parameters** | **Unit** | **Bidders to fill up** | | |
| | | | **ACSR Conductor (Wolf)** | **ACSR Conductor (Panther)** | **ACSR Conductor (Zebra)** |
| 1 | Manufacturer | | | | |
| 2 | Manufacturer Type Designation | | | | |
| 3 | Applicable standard | | | | |
| 4 | Nominal size of Conductor | $mm^2$ | | | |
| 5 | Purity of material | | | | |
| 6 | Percentage of carbon, sulphur phosphorus in steel wire rod | | | | |
| 7 | Nominal Aluminium area | $mm^2$ | | | |
| 8 | Tolerance in diameter | | | | |
| 9 | Guaranteed ultimate breaking strength | Kg / KN | | | |
| 10 | Weight in Kg/Km | Kg/km | | | |
| 11 | Resistance Ω/Km | | | | |
| 12 | Co-efficient of linear expansion °C per °C x $10^{-6}$ | | | | |
| 13 | Stranding and wire diameter<br>a) Aluminum in mm | | | | |

| Sl. No. | Parameters | Unit | Bidders to fill up | | |
|---|---|---|---|---|---|
| | | | ACSR Conductor (Wolf) | ACSR Conductor (Panther) | ACSR Conductor (Zebra) |
| | b) Steel in mm | | | | |
| 14 | Overall diameter of conductor in mm | mm | | | |
| 15 | Breaking load of conductor | KN | | | |
| 16 | Breaking load of Aluminum wire after stranding | KN | | | |
| 17 | Breaking load of steel wire after stranding | KN | | | |
| 18 | Resistance in Ω/Km at 20°C of the complete conductor (Max) in Ω/Km | Ω/Km | | | |
| 19 | Continues maximum current rating of the complete conductor (Max) in A | Amps | | | |
| 20 | Standard length of the conductor in one drum | Mtr. | | | |
| 21 | Approved grease to be applied for each conductor inner layer as cover to fill the interstices between the strands of the outer layer | | | | |
| 22 | Conductor drum material & dimension | | | | |
| 23 | Overall weight of drum & conductor per drum | Kg. | | | |

Procurement Services Department
Thimphu Bhutan
Bhutan Power Corporations Limited

## Lot No. 1: ACSR Conductors

| SL No | Materials Description | UoM | Qty | Offered Brand and Country of Origin | Unit Rate in DDP (Nu.) | Amount in DDP (Nu.) |
|---|---|---|---|---|---|---|
| 1 | ACSR Conductor (Wolf)-150sqmm | KM | 4 | | | |
| 2 | ACSR Conductor (Panther): 261.50mm | KM | 4 | | | |
| 3 | ACSR Conductor (Zebra)-400sqmm | KM | 2 | | | |
| **Total Amount (Nu.)** | | | | | | |



# Technical Specification for Lot No. 2 (Distribution Pillars, Spike Earthing and Lightening Arrestor)

# 1. Distribution Pillar

## 1.0 Scope

This specification covers the design, manufacture, testing at manufacture's work before dispatch, packing and transportation to BPC stores.

## 1.1 Code and Standard:

The construction, inspection and testing of the feeder pillar shall comply with all currently applicable status, regulations and safety codes in the locality where the feeder pillar will be installed. The feeder pillar drawing is attached herewith. Supply items which are brought out by manufacturers shall be procured from the approved manufacturers acceptable to the Procurement Services Department, BPC.

## 1.2 Construction Features:

1.2.1 The Distribution Pillar shall be sheet steel enclosed and should be robust, dust, weather and vermin proof providing a degree of protection of IP 52 for indoor use and IP 54 for outdoor use. Sheet steel used shall be cold rolled grain oriented (CRGO) and at least 2.5 mm thick smooth finished, leveled and free from flaws and properly braced to prevent wobbling.

1.2.2 The Distribution pillar shall be provided with hinged doors openable from the center. It should be also provided with IEC standard type lock and pad locking arrangement.

1.2.3 Doors, removable covers, if any and plate shall be gasketed all around with neoprene gaskets, and this is essential to prevent ingress of dust and vermin.

1.2.4 All live parts shall be provided with at least phase to phase and phase to earth clearance in air of 25 mm and 20 mm respectively.

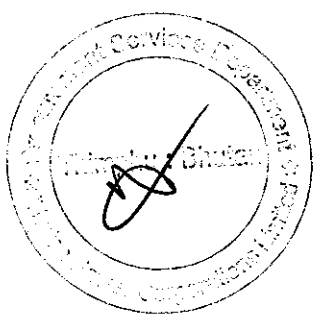
1.2.5 The suitable removable cable gland plate of 2.5 mm cold rolled sheet steel should be provided. The interior cabling space should be strictly as per drawing attached.

1.2.6 The external earthing terminal with M1O and 19 mm x 6 mm Aluminum alloy of E91E grade earthing strip inside should be provided.

## 1.3 Painting:

1.3.1 All parts shall be cleaned in a six stage surface prep machine prior coating, including:

- Heated alkaline wash;
- Fresh Water rinse;
- Heated iron phosphate coat;
- Fresh water rinse;
- Recirculated deionised water rinse;
- Fresh deionised water mist



1.3.1 After prepping, the equipment shall be dried at 250 degrees for 5-1/2 minutes.

1.3.2 Epoxy polyester hybrid power plant shall be electrostatically applied.

1.3.3 The coated parts are then oven cured for 20 minutes at up to 450 degrees to provide a furniture quality finish. The hot parts are cooled to ambient temperature prior to packaging.

1.3.4 After curing, the paint finish is inert and no volatile emissions are present. There are no fugitive (stray) emissions in the finished product.

1.3.5 Gloss: 50 – 60 degrees
Impact Resistance: 18.07 Nm
Flexibility: 180 degrees, ¼ "mandrel
Pencil hardness: 2H
Cross hatch adhesion: 100%
Salt spray: 200 hours minimum
Humidity resistance: 200 hours minimum
Micron thickness: 80 microns

**1.4 Main Busbar:**

1.4.1 Main busbar shall be of Aluminum alloy of grade E91E, and as specified in drawing and conforming to relevant standard IS: 5082.

1.4.2 Busbar shall be located in horizontal formation but with gradual gradient as indicated in drawing.

1.4.3 All busbar shall be a solid strip without joints and shall be rated continuously. The maximum temperature of the busbar under operating conditions when carrying rated normal current at rated frequency should not exceed 85°C.

1.4.4 Busbar shall be adequately supported on insulators to withstand dynamic stresses due to short circuit current. Busbar support insulators shall conform to relevant standard IS: 2544.

1.4.5 Busbar should not be painted and all performance characteristics specified shall be obtained with unpainted busbars.

**1.5 Fuses:**

1.5.1 Generally, fuses shall be of HRC cartridge fuse link (Blade contact type), mounted on different sizes of fuse bases required for different sizes of HRC fuses as per requirement under the Price Schedule having a rupturing capacity of 80 kA at 415 V, A.C. 50 Hz.

**1.6 Interior Lighting**

1.6.1 The Distribution Pillar shall be provided with a 230V, single phase, 50 Hz, 40W preferably incandescent lamp fixture placed diagonally opposite for interior

Procurement Services Department ☆ Thimphu : Bhutan ☆

illumination and controlled by a piano switch and HRC fuse link HF of 2 Amps for lamp.

1.6.2 The Distribution Pillar should be supplied completely wired, ready for the Bhutan Power Corporation Limited's external connections at the terminal blocks. All wiring should be carried out with 650 V grade, PVC insulated, 7/20 standard copper wire.

**1.7 Labels and Danger Plate:**

1.7.1 The Distribution Pillar shall be provided with individual component labels with pillar designation or rating. The danger sign as indicated in drawing should be drawn on every pillar. Both external-earthing terminals shall be levelled.

**1.8 Colour of the Enclosure**

**The colour of enclosure should be RAL 7035 (Light Grey).**

**1.9 Submission of Test Certificate & Drawings**

**The supplier shall provide the type test certificates for the boxes done within Ten (10) years from the reputed testing laboratory.**

The Supplier shall provide to the Purchaser the drawings if the contract is awarded for the final approval.

## 2. Spike Earthing

Spike earthing is used for 11 kV & 33 kV pole earthing. Spike Earthing consist of 25x6 mm, 1.5 meter long GI flat, 2.5 meter long spike earthing electrode with necessary holes as indicated on the drawing.

## 3. Surge Arrestor /Lightning Arrestor

The surge arresters shall be of the metal oxide, gapless, single pole type, suitable for outdoor use on a three-phase 50 Hz system and shall have the following parameters:

**Table 1: Specification of Surge Arrestors**

| Parameter | 33 kV | 11 kV |
|---|---|---|
| Applicable standard | IS 3070, IEC 60099-4 | |
| Rated Voltage (rms) | 30 kV | 9 kV |
| Nominal discharge current (kA) | 10 kA | 10 kA |
| MCOV | 24.4 kV | 7.65 kV |
| **Maximum Residual Voltages for:** | | |
| Steep Current impulse (1/20 micro sec.) | 85 kV | 26.5 kV |
| Lightning Impulse protection level (8/20 micro sec.) | 71.8 kV | 21.7 kV |
| Switching impulse protection level (30/60 micro sec.) | 60 kV | 18 kV |

| | |
|---|---|
| Type of Housing Insulator | Polymer with alternating sheds |
| Moisture sealing system | Housing directly molded onto the arrester. Housing pressed on arrester with caps at the end not acceptable. |
| Colour | Grey/Brown |

Note: Ground and line lead of the arrester is important. The lead voltage can contribute as much as the arrester protective level for long length. Therefore, arrester lead length shall be as short and straight as possible.

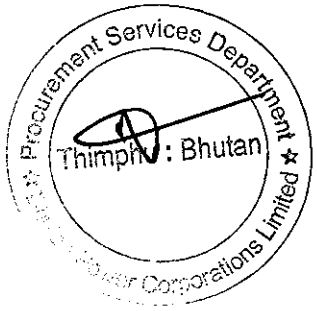
### 3.1 Arrester Fittings

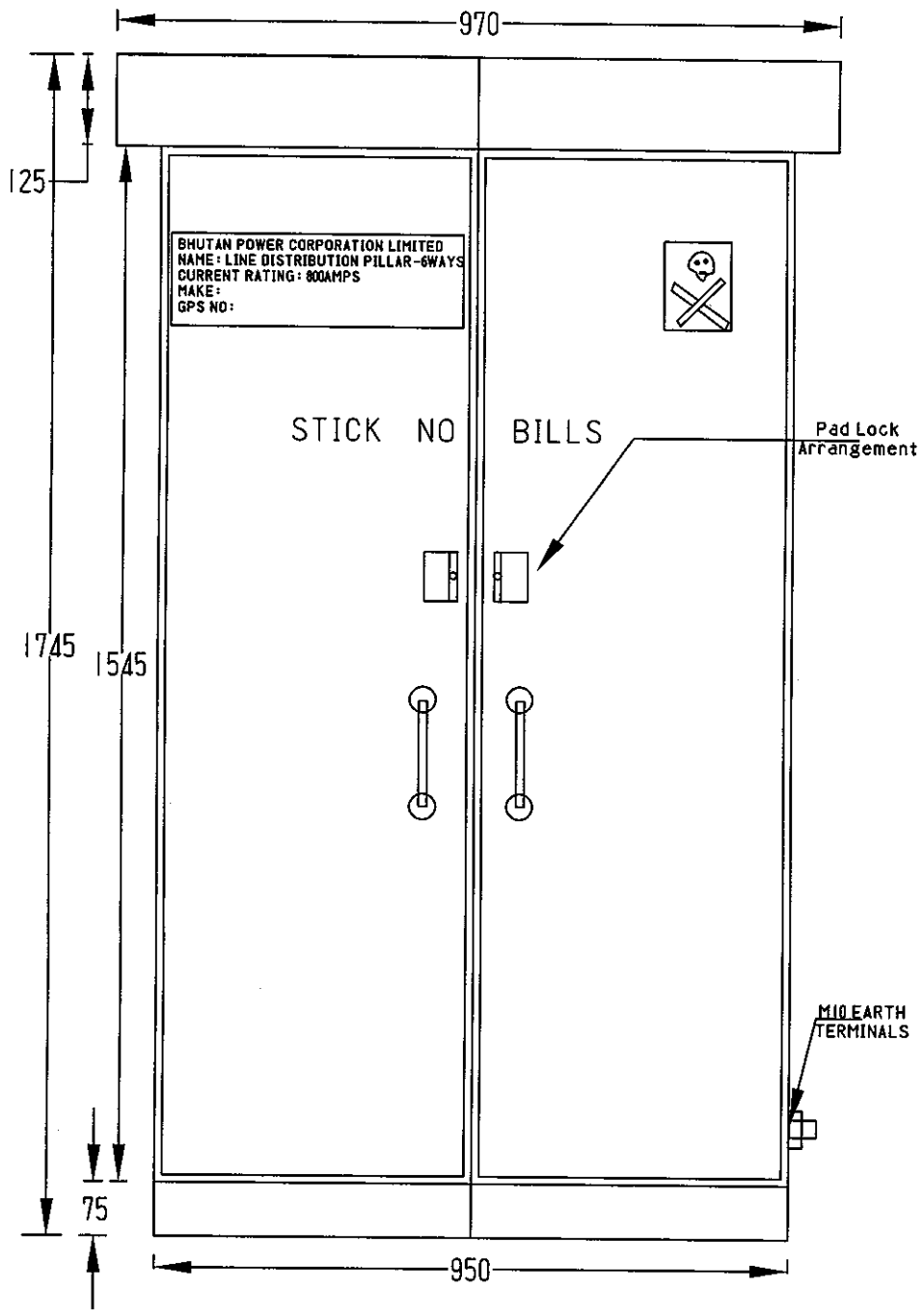
Surge arresters will be connected between phase and earth to protect distribution transformers and switchgear. It shall be complete with the following:

- Arrester terminal shall be nut and bolt (M12), suitable for connecting lugs with 14 mm dia hole or clamp type to accommodate standard conductor sizes used by BPC.
- Earth connection lead or earthing clamp terminals.
- The surge arresters shall be provided with mounting brackets complete with bolts, nuts and washers, suitable for mounting either vertically or horizontally on cross-arm channel (ISMC 75x40) bearing 18 mm dia holes.
- Disconnector device for disconnecting it from the system in the event of arrester failure to prevent a persistent fault in the system and it shall give a visible indication when the arrester has failed. The arrester disconnector shall be tested as per IEC 60099-4.
- Over pressure relief device shall be provided for relieving internal pressure in an arrester and preventing explosive shattering of the housing following prolonged passage of flow current or internal flashover of the arrester.

### 3.2 Consideration at High Altitude

- If low altitude designed arrester is used at high altitude, possibility exists that the internal pressure of the arrester will be sufficiently high to cause a leak in the seal arrester allowing moisture to enter it causing failure. Therefore due attention must be given to moisture sealing system employed by the manufacturer.
- A second potential problem exists with the new metal oxide arresters in which the overall length of the housing is decreased substantially. Attention must be given to assure that an adequate margin exists between the arrester protective characteristics and the external flashover of the housing at high altitude.



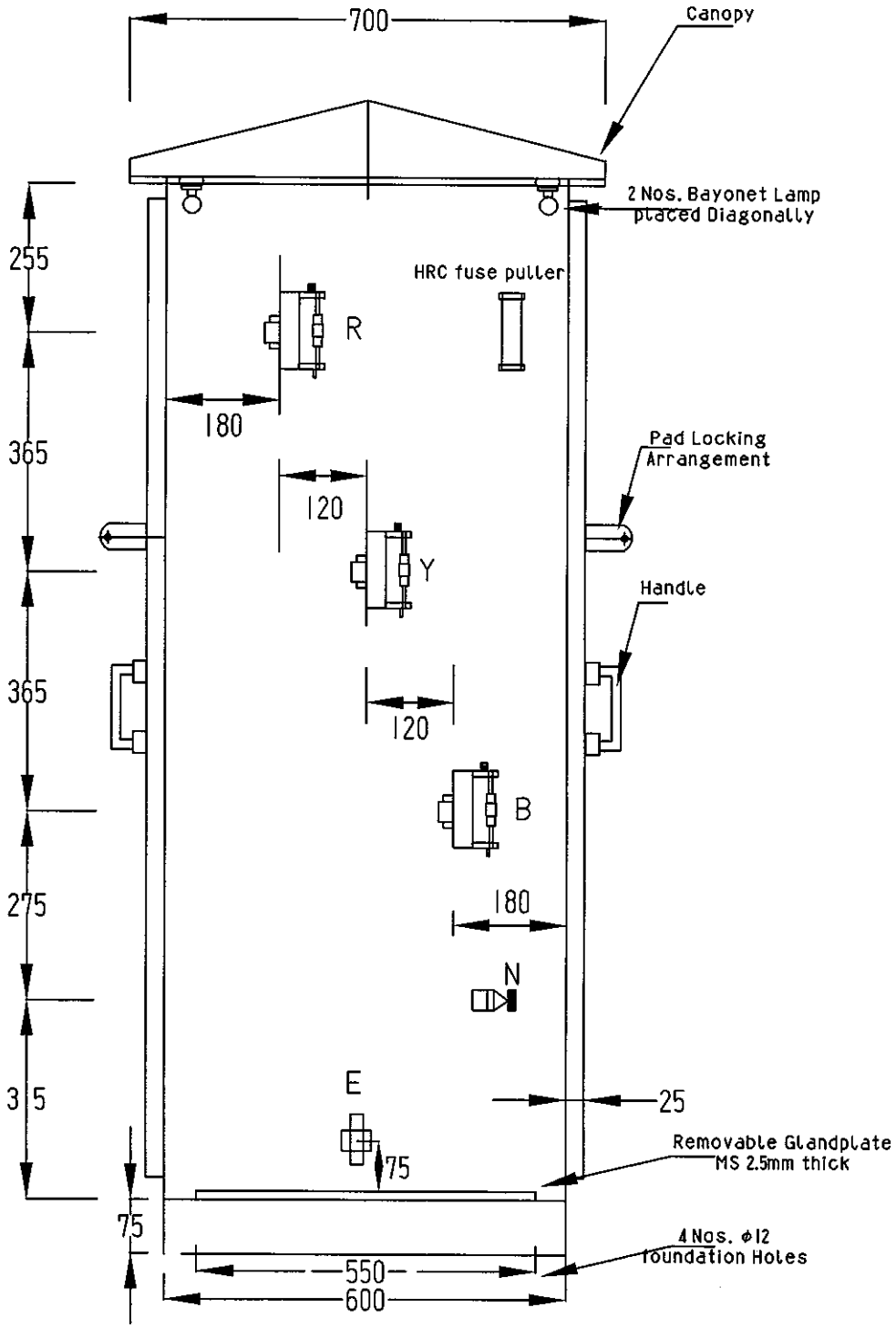



NOTES

1. DIMENSIONS AS SHOWN ARE IN MM.
2. DRAWING NOT TO SCALE.

| | | |
|---|---|---|
| BHUTAN POWER CORPORATION LIMITED | ENGINEERING DESIGN & RESEARCH DEPARTMENT | |
| | TITLE : DISTRIBUTION DESIGN & CONSTRUCTION STANDARD<br>DISTRIBUTION PILLAR (FRONT ELEVATION) | |
| | DRAWING NO. BPC-DDCS-2020-27/1-5 | REVISION 2020 |

| TITLE | NAME | DATE |
|---|---|---|
| DESIGNED BY | | |
| CHECKED BY | | |
| APPROVED BY | | |




NOTES

1. DIMENSIONS AS SHOWN ARE IN MM.THE PILLAR SHALL BE TWO SIDED DOORS
2. DRAWING NOT TO SCALE.

BHUTAN POWER CORPORATION LIMITED

ENGINEERING DESIGN & RESEARCH DEPARTMENT

TITLE : DISTRIBUTION DESIGN & CONSTRUCTION STANDARD

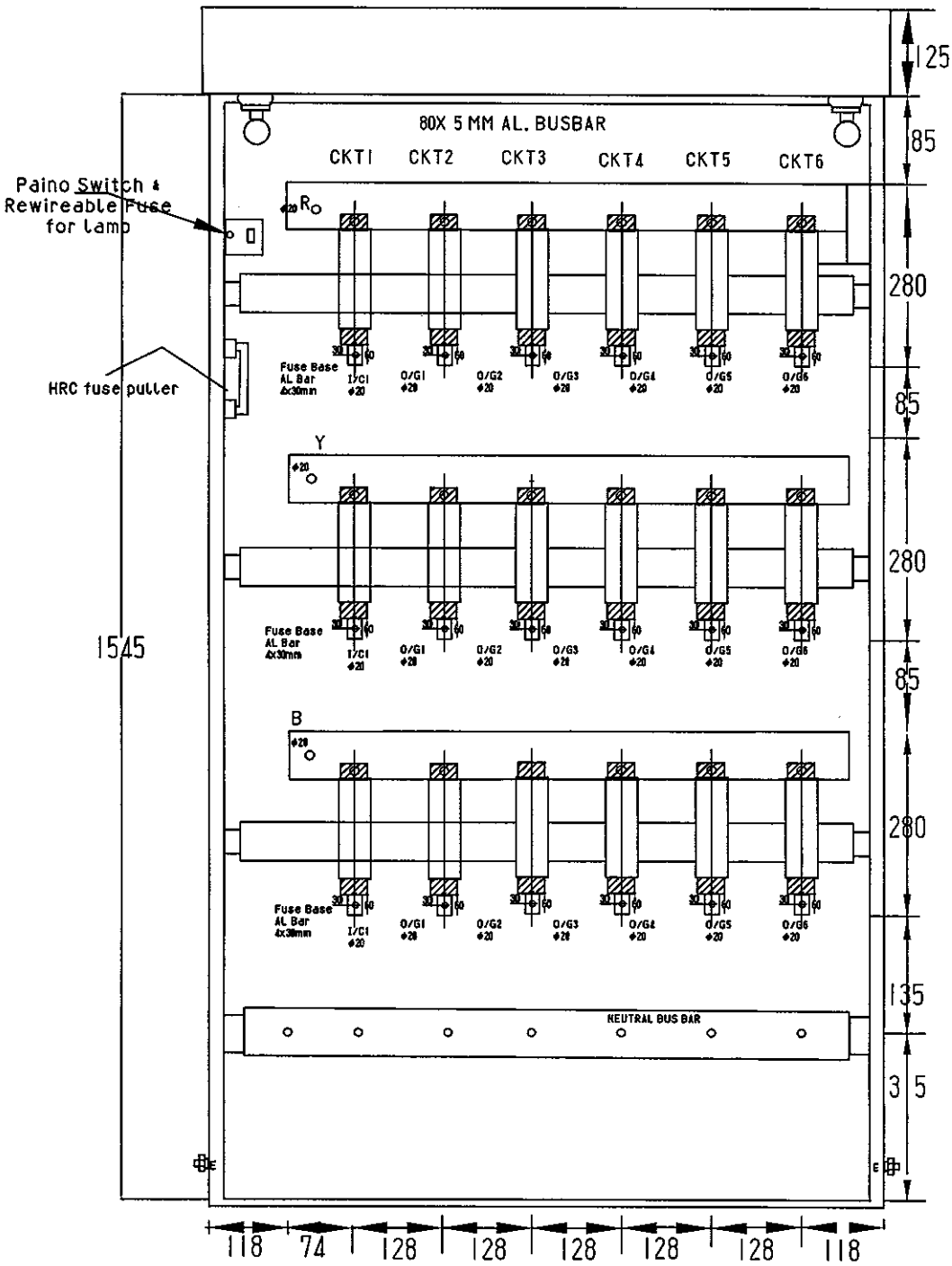
DISTRIBUTION PILLAR (SIDE ELEVATION)

| TITLE | NAME | DATE |
|---|---|---|
| DESIGNED BY | | |
| CHECKED BY | | |
| APPROVED BY | | |

DRAWING NO. BPC-DDCS-2020-27/2-5

REVISION 2020

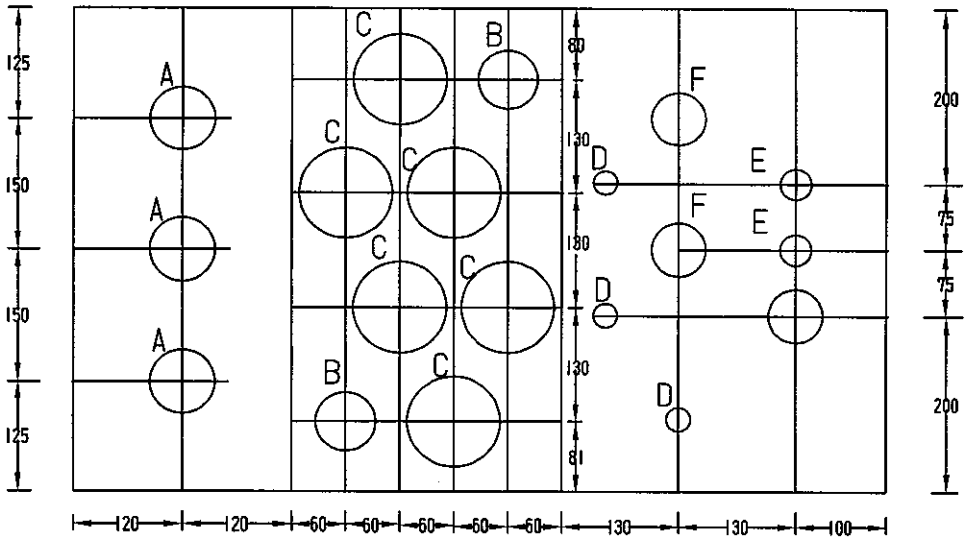
Procurement Services Department ☆ Thimphu : Bhutan ☆ Bhutan Power Corporation Limited




NOTES

1. DIMENSIONS AS SHOWN ARE IN MM.
2. PROVIDE ONE NO. FUSE FULLER FOR EVERY DISTRIBUTION BOARD

| | | |
|---|---|---|
| BHUTAN POWER CORPORATION LIMITED | ENGINEERING DESIGN & RESEARCH DEPARTMENT | |
| | TITLE : DISTRIBUTION DESIGN & CONSTRUCTION STANDARD | |
| | DISTRIBUTION PILLAR (FRONT ELEVATION WITHOUT DOOR) | |
| TITLE / NAME / DATE | DRAWING NO. | REVISION |
| DESIGNED BY | BPC-DDCS-2020-27/3-5 | 2020 |
| CHECKED BY | | |
| APPROVED BY | | |




| MS. GLAND PLATE | HOLE SIZE |
|---|---|
| A - 1CX500SQ.MM - KNOCKOUT | 6.72" |
| B - 4CX400SQ.MM - KNOCKOUT | 3.16" |
| C - 4CX300SQ.MM - KNOCKOUT | 2.78" |
| D - 4CX240SQ.MM - KNOCKOUT | 2.25" |
| E - 2CX6SQ.MM | 0.75" |
| F - 2CX10SQ.MM | 1" |

BHUTAN POWER CORPORATION LIMITED

ENGINEERING DESIGN & RESEARCH DEPARTMENT

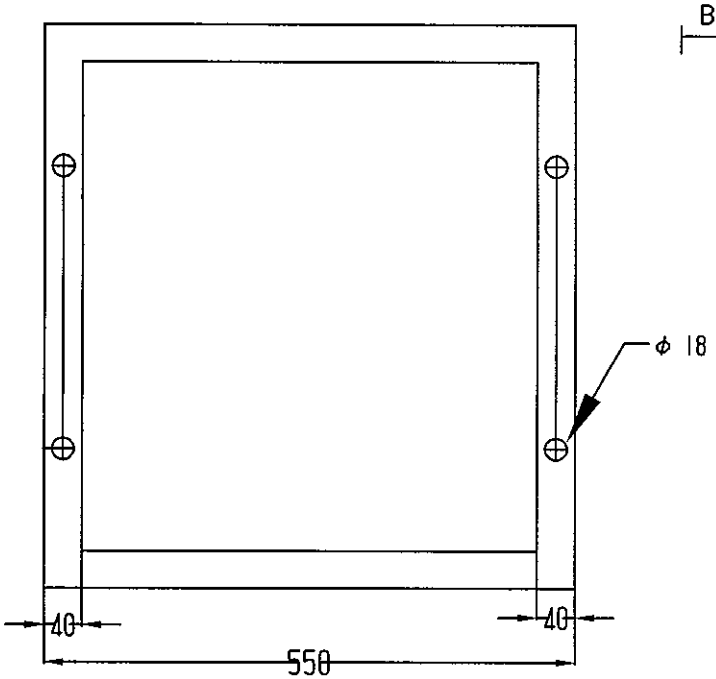
TITLE : DISTRIBUTION DESIGN & CONSTRUCTION STANDARD

DISTRIBUTION PILLAR
(GLAND PLATE DETAILS)

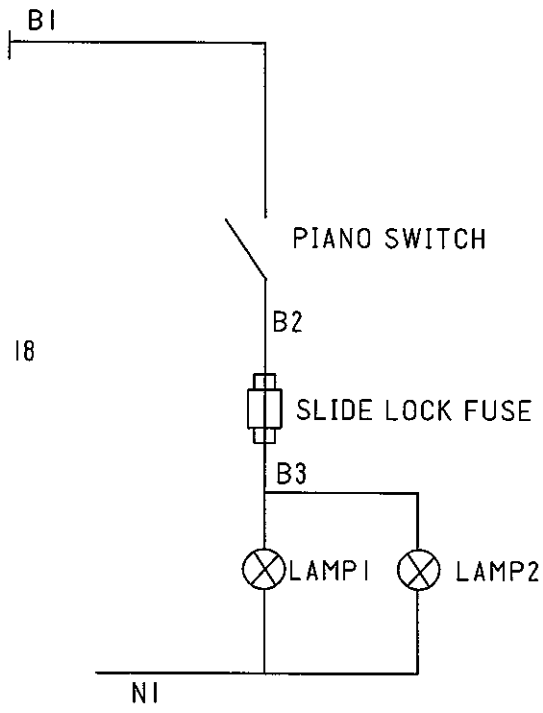
| TITLE | NAME | DATE |
|---|---|---|
| DESIGNED BY | | |
| CHECKED BY | | |
| APPROVED BY | | |

DRAWING NO.
BPC-DDCS-2020-27/4 -5

REVISION
2020



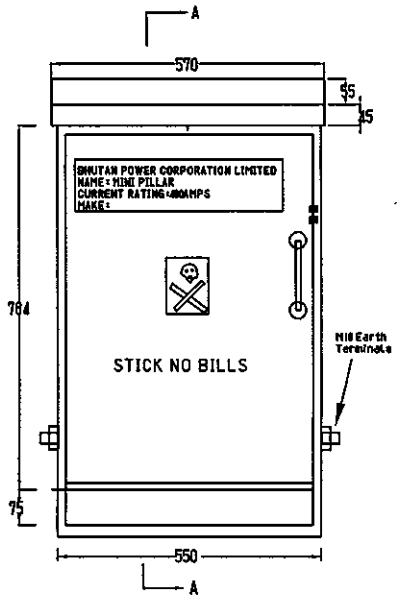

FOUNDATION PLAN



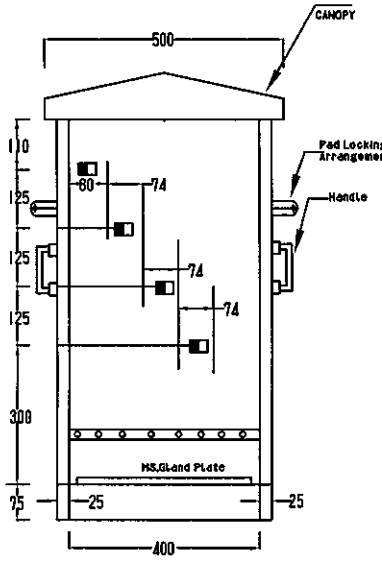

NOTES:
PHASE-80x5MM AL -3NOS., NEUTRAL -80x5MM AL-1 NO. MATERIAL&EARTH-1X6X20MM, AL ALLOY.
THE FEEDER PILLAR (INCLUDING BASE CHANNEL) SHALL BE FABRICATED OUT OF 2.5MM MS SHEET
PAINT-SEIMENS GREY.

CORRECT CABLE GLAND SIZE TO BE USED ACCORDINGLY WITH CABLE SIZE
REFER TABLE 105 FROM DDCS FOR FUSE RATING

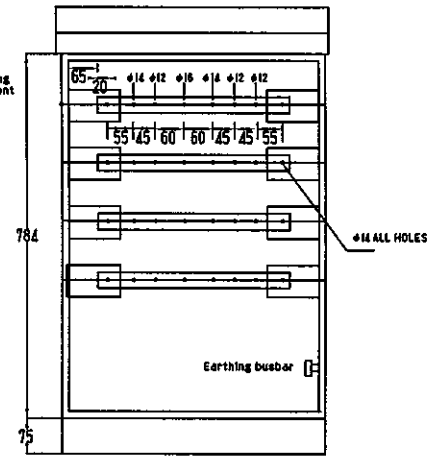
| | | |
|---|---|---|
| BHUTAN POWER CORPORATION LIMITED | ENGINEERING DESIGN & RESEARCH DEPARTMENT | |
| | TITLE : DISTRIBUTION DESIGN & CONSTRUCTION STANDARD<br>DISTRIBUTION PILLAR<br>(FOUNDATION DETAILS AND LIGHTING CKT) | |
| TITLE / NAME / DATE | DRAWING NO.<br>BPC-DDCS-2020-27/5-5 | REVISION<br>2020 |
| DESIGNED BY | | |
| CHECKED BY | | |
| APPROVED BY | | |



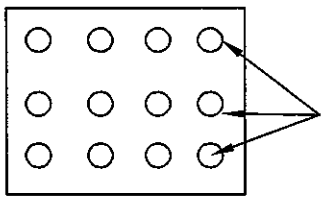

FRONT ELEVATION



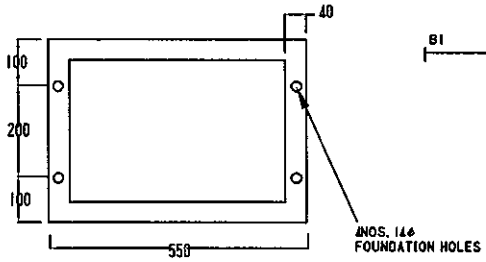

SIDE ELEVATION: (A:A)



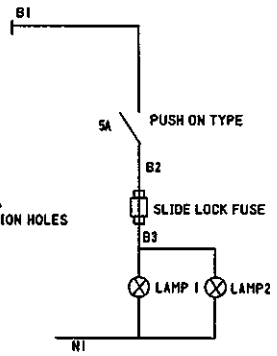

FRONT ELEVATION
WITHOUT DOOR




GLAND PLATE DETAILS



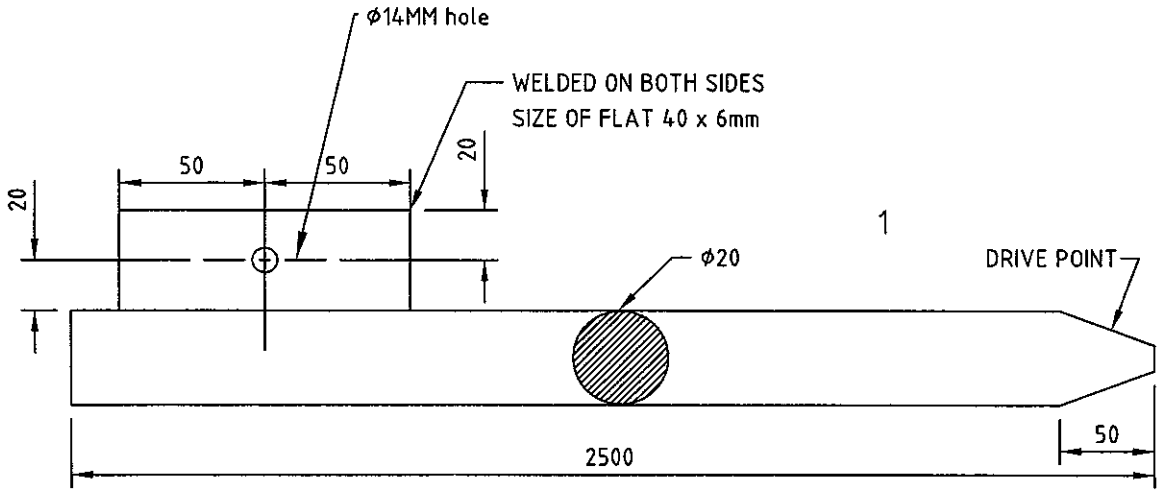

FOUNDATION PLAN



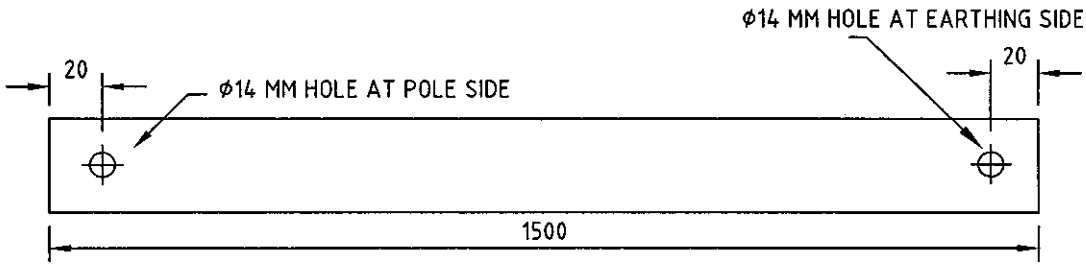

PHASE BUS BAR -1X6X50MM AL. ALLOY
NEUTRAL -1X6X50MM AL.ALLOY.
MATERIAL -THE FEEDER PILLAR (INCLUDING BASE CHANNEL SHALL BE FABRICATED OUT OF 2.5MM MS SHEET
PAINT -RAL 7035
EARTH BUS BAR -1X6X20MM AL. ALLOY.

NOTES
1. DIMENSIONS AS SHOWN ARE IN MM.
2. DRAWING NOT TO SCALE.

| | | |
|---|---|---|
| BHUTAN POWER CORPORATION LIMITED | ENGINEERING AND RESEARCH DEPARTMENT | |
| | TITLE : DISTRIBUTION DESIGN & CONSTRUCTION STANDARD | |
| | MINI FEEDER PILLAR 400AMPS | |
| TITLE / NAME / DATE | | |
| DESIGNED BY | | |
| CHECKED BY | DRAWING NO. BPC-DDCS-2020-25 | REVISION 2020 |
| APPROVED BY | | |




EARTHING ROD




EARTHING FLAT 25X6 MM

GRADE OF STEEL: BS 4360 GRADE 43A OR EQUIVALENT
GALVANISED TO: BS 729 OR EQUIVALENT
PACKING: EARTING RODS, NUTS & BOLTS, FLATS TO BE PACKED SEPARATELY

| ITEM | NAME OF ITEM | QTY | MATERIAL | SIZE |
|---|---|---|---|---|
| 5 | WASHER SPRING | 4 | HDG STEEL | M12 |
| 4 | NUT HEX | 4 | HDG STEEL | M12 |
| 3 | EARTHING FLAT 25X6MM | 1 | HDG STEEL | 1.5Meter |
| 2 | BOLT HEX | 4 | HDG STEEL | M12 x 25 x FT |
| 1 | EARTHING ROD | 1 | HDG STEEL | M20 x 2500 |

BHUTAN POWER CORPORATION LIMITED

ENGINEERING AND RESEARCH DEPARTMENT

DISTRUBUTION DESIGN & CONSTRUCTION STANDARD

SPIKE EARTHING SET

| TITLE | NAME | DATE |
|---|---|---|
| DESIGNED BY | | |
| CHECKED BY | | |
| APPROVED BY | | |

DRAWING NO.BPC-DDCS-2020-21/1-2 REVISION 2020

## GTP for Bidders to Fill up

**Lot 2 (Item 1 & 2)-Distribution Pillar**

| SL. No | Parameters | Unit | Bidders to fill up | |
|---|---|---|---|---|
| | | | 3P, 800A Distribution Pillar, 6 ways (I/C 800A HRC, O/G 800A HRC) | Mini fedder pillar 400A, 6W |
| 1 | Name of Manufacturer and country | | | |
| 2 | Applicable standards | | | |
| 3 | Rated short time withstand current | | | |
| 4 | Rated Voltage | V | | |
| 5 | Rated Frequency | Hz | | |
| 6 | No. of phases and rated frequency | | | |
| 7 | Clearances Phase to phase | | | |
| 8 | Clearances between live parts and earth | | | |
| 9 | Type and thickness of sheet steel (hot/ cold rolled) Frame/Doors/Covers | | | |
| 10 | HRC Cartridge fuse used | | | |
| 11 | Fuse rupturing capacity | kA | | |
| 12 | Degree of protection of Enclosure | | | |
| | Colour finish shade of Pillar | | | |

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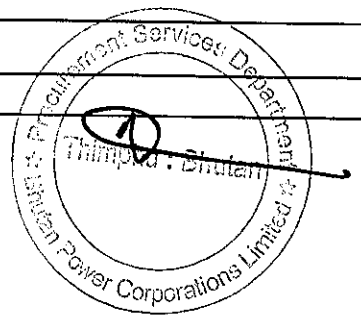
| SL. No | Parameters | Unit | Bidders to fill up | |
|---|---|---|---|---|
| | | | 3P, 800A Distribution Pillar, 6 ways (I/C 800A HRC, O/G 800A HRC) | Mini fedder pillar 400A, 6W |
| 13 | Interior | | | |
| | Exterior | | | |
| | **Bus Bars** | | | |
| 1 | Material | | | |
| 2 | Cross section | | | |
| 3 | Rated normal current of busbars | A | | |
| 4 | Rated short time withstand current and time | kA | | |
| 5 | Material of the support insulators | mm | | |
| 6 | Painting and shade | | | |
| 7 | Earth bus bar size and material | | | |
| 8 | Impulse withstand voltage | kVp | | |
| | **Moulded Case Circuit Braeker** | | | |
| 1 | Make | | | |
| 2 | Rated Frequency | Hz | | |
| 3 | Number of poles | | | |
| 4 | Breaking Capacity | kA | | |
| 5 | Rated Current | A | | |

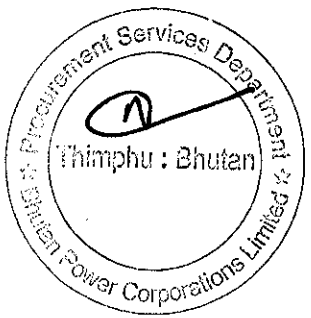


**GTP for Bidders to Fill up**

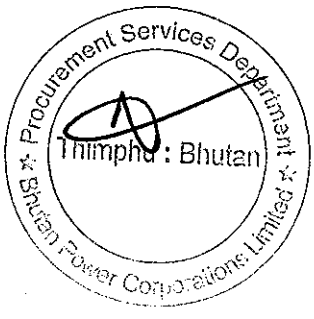
| Lot 2 (Item 4): Lightning Arrestors | | | |
|---|---|---|---|
| **Sl. No.** | **Parameters** | **Units** | **Bidders to fill up** |
| | | | **30 kV, 10 kA Polymer Lightening Arrestor complete set (Satation type)** |
| 1 | Manufacturer | | |
| 2 | Manufacturer's Type Designation | | |
| 3 | Applicable Standards | | |
| 4 | Maximum continuous operating voltage (phase voltage) | kV rms | |
| 5 | Rated voltage | kV rms | |
| 6 | Rated nominal discharge current | kA | |
| 7 | Residual voltage for a 8/20 ms nominal discharge current (Clause 7.3.2 IEC 99-4) | kV peak | |
| 8 | Residual voltage for 1/20 ms, 10 kA lightning impulse current | kV peak | |
| 9 | Number of sections per Surge Arrester | | |
| 10 | Type of dielectric that fills the space between the surge arrester and porcelain | | |
| 11 | Maximum discharge current withstand capability | kA | |
| 12 | Energy absorption capability | kJ/kV | |
| 13 | Material of main terminal | | |
| 14 | Material of earthing terminal | | |
| **Surge Arresters Housing** | | | |
| 1 | Manufacturer | | |
| 2 | Manufacturer's Type Designation | | |
| 3 | Applicable Standards | | |
| 4 | Rated voltage | kV | |
| 5 | Full wave withstand test (impulse voltage) | | |
| a | Positive | kVp | |
| b | Negative | kVp | |
| 8 | Wet withstand power frequency test voltage | kV rms | |
| 9 | Nominal insulator creepage distance mm/kV | mm | |
| 10 | Maximum permissible cantilever load | N | |
| 11 | Material | | |
| 12 | Colour of bushing insulator | | |
| 13 | Weight of complete arrester with bushing | kg | |

**Lot No. 2: Distribution Pillar, Spike Earthing and Lightening Arrestor**

| Sl. No. | Materials Description | UoM | Qty | Offered Brand and Country of Origin | Unit Rate in DDP (Nu.) | Amount in DDP (Nu.) |
|---|---|---|---|---|---|---|
| 1 | 3P, 800A Distribution Pillar, 6 ways (I/C 800A HRC, O/G 800A HRC) | NO | 101 | | | |
| 2 | Mini fedder pillar 400A, 6W | NO | 4 | | | |
| 3 | Spike Earthing | SET | 210 | | | |
| 4 | 30 kV, 10 kA Polymer Lightening Arrestor complete set (Satation type) | SET | 20 | | | |
| **Total Amount (Nu.)** | | | | | | |



# Technical Specification for Lot No. 3 (Cable Jointing Kits)



**Cable Jointing Kits**

**1. General Specifications**

a. The cable accessories should be suitable for storage without deterioration in properties at temperatures up to 50 deg C and should have unlimited shelf life.

b. Fluorinated Silicon Grease should be provided for filling up the minor nicks & scratches on the insulation that may occur while removing the Semi conducting screen of the Cable.

**2. END TERMINATIONS**

a. Class of Termination: The End termination should be Class - I as defined by IEEE 48 Standard & amended up to date.

b. Stress Control :

- The stress control at the screen cutback should be provided by a Heat Shrinkable tubing having a minimum volume resistivity of $10^{10}$ Ohms cm. The relative permittivity of the tubing should be at least 15.

- To eliminate voids caused at the step due to semiconducting screen cutback, the manufacturer should provide high permittivity mastic the permittivity of which should be at least 15.

- The impedance of the stress control tubing should not change over a range of temperature of 0 deg C – 125 deg C, which is the temperature range over which an XLPE cable is expected to operate

c. Protection to Insulation :

A heat shrinkable tubing should be applied over exposed cable dielectric.
The material should be:

(1) Non tracking
(2) Weather resistant
(3) Erosion resistant
(4) U. V. radiation resistant

Test reports conforming that there is no degradation of the material after prolonged exposure to elevated temperatures This should include

- Thermal endurance- An Arrhenius plot to confirm the life expectancy on continuous at a temperature of 90 deg C.

- The materials should pass Tracking & Erosion Resistant test in accordance with ASTM D 2303.

- For weather resistance the materials should be tested on Atlas weather-O- meter test.

- The materials should be tested as per EMMAQUA test procedure for evaluating it's resistance to Ultra Violet radiations.

d. Environment sealing:

At the lug end the sealing against ingress of moisture should be provided by non-tracking sealant strips followed by heat shrinkable non tracking, erosion & weather resistant tubing precoated with non tracking sealant.

For 3 core cable the sealing at the crutch area should be provided by a heat shrinkable non tracking erosion & weather resistant breakout internally coated with a non tracking hot melt adhesive.

e. Provision for Earthing

The Copper tape screen and armour of the cable should be earthed by tinned copper braids of appropriate size provided with lug at one end.

## 3. STRAIGHT THROUGH JOINTS

a. Conductor Continuity

Proper conductor continuity should be ensured either by Crimping or by using Shear head bolted connector.

b. Stress Control :

- The stress control at the screen cutback should be provided by a heat shrinkable tubing having a minimum volume resistivity of $10^{10}$ Ohms cm. The relative permittivity of the tubing should be at least 15.

- To eliminate voids caused at the step due to semiconducting screen cutback , the manufacturer should provide a high permittivity mastic the permittivity of which should be at least 15.

- The impedance of the stress control tubing should not change over a range of temperature of 0 deg C – 125 deg C, which is the temperature range over which an XLPE cable is expected to operate.

c. Reinstatement of Insulation:

- This should be affected by means of a heat shrinkable, flexible, polymeric tubing

made from discharge resistant polymer. The tubing after complete recovery should have a minimum wall thickness of 3 mm to ensure provision of adequate insulation in one step.

- To ensure a void free bond between the rebuilt tubing and screen the manufacturer should supply a single dual walled tubing. This enables the final insulating layer to be installed complete with a conductive polymeric screen.

- The kit should be provided with a high permittivity hot-melt mastic for applying over the ferrule to eliminate voids and sharp edges.

d. Armour/ Screen Continuity:

The continuity of the copper tape screen should be affected by tinned copper Mesh and that of the armour by tinned copper braids of adequate cross section.

e. Environment Sealing :

The joints should be protected against ingress of moisture by a polymeric flexible heat shrinkable tubing precoated with hot melt adhesive. This should completely cover metallic sheaths/ earth connections.

**4. TEST**

a. The kits should be tested as per test sequence of VDE 0278 or IS: 13573 as per latest amendments

b. **The bidder shall submit type test certificate along with the bid done within ten (10) years from the reputed testing laboratory.**

c. The Joints/ Terminations should be type Tested for series 1 and series 2 along with **SALT FOG TEST** at per testing procedures.

d. All Heat Shrinkable components should be tested as per ESI-09-13.

e. The manufacturer should provide life assessment test (accelerated ageing test) reports to prove that the heat shrinkable components are capable of retaining their properties within acceptable limits during the course of long term usage.

f. TERT (Track Erosion and Resistance Test) should be conducted on heat shrinkable tube used in termination to prove that they are non-tracking.

g. The manufacturer should also furnish graphs showing the variation of impedance of the stress control tubing with respect to (1) change in temperature and (2) Time (aging at constant temperature).

**Jointing Kits (Outdoor/Indoor/Straight Through)**

| Sl | Particulars | Unit | Technical Particulars |
|---|---|---|---|

| No. | | | | |
|---|---|---|---|---|
| 1 | **Type** | | Heat shrinkable type | |
| 2 | Applicable Standards | | IS:13573 | |
| 3 | Rated Voltage U/Uo(Um) | kV | 6.35/11 | 19.05/33 |
| 4 | AC Voltage withstand | kV(1min) | | |
| | Dry | | 28 | 70 |
| | Wet | | 35 | 75 |
| 5 | Impulse voltage withstand(10 positive and 10 negative, 1.2us between each conductor and the ground screen) | kV | 75 | 170 |
| 6 | Partial Discharge | kV | 12.7 | 38 |
| 7 | Loading Cycle(60 cycle 5h heating, 3h cooling conductor temperature: 5+operating temperature) | | 16 | 50 |
| | Kit Particulars | | | |
| 8 | Materials of the tubing/moulded part | | Heat shrinkable | Heat shrinkable |
| 9 | Method of stress control | | Heat shrinkable | Heat shrinkable |
| 10 | Method of environment seal | | As per IS Standard | As per IS Standard |
| 11 | Allowable Kit storage temperature | Degree | Unlimited | Unlimited |
| 12 | All the jointing kits(outdoor/indoor/straight through joint kit)is complete with all accessories | (Yes/No) | Yes | Yes |

## GTP for Bidders to Fill up

| Lot 3 (Item 1-6)- Indoor Termination kit | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Sl No.** | **Particulars** | **Unit** | **Bidders to Fill up** | | | | | |
| | | | **ID Termination Kit 1x630sqmm 11kV** | **ID Termination Kit 1x630sqmm 33kV** | **ID Termination Kit 3x150 sqmm 33kV** | **ID Termination Kit 3x185 sqmm 33kV** | **ID Termination Kit 3x300 sqmm 11kV** | **ID Termination Kit 3x300 sqmm 33kV** |
| 1 | **Type** | | | | | | | |
| 2 | Applicable Standards | | | | | | | |
| 3 | Rated Voltage U/Uo(Um) | kV | | | | | | |
| 4 | AC Voltage withstand | kV(1min) | | | | | | |
| | Dry | | | | | | | |
| | Wet | | | | | | | |
| 5 | Impulse voltage withstand(10 positive and 10 negative, 1.2us between each conductor and the ground screen) | kV | | | | | | |
| 6 | Partial Discharge | kV | | | | | | |
| 7 | Loading Cycle(60 cycle 5h heating, 3h cooling conductor temperature: 5+operating temperature) | | | | | | | |
| | Kit Particulars | | | | | | | |
| 8 | Materials of the tubing/moulded part | | | | | | | |
| 9 | Method of stress control | | | | | | | |
| 10 | Method of environment seal | | | | | | | |
| 11 | Allowable Kit storage temperature | Degree | | | | | | |
| 12 | All the jointing kits(outdoor/indoor/straight through joint kit)is complete with all accessories | (Yes/No) | | | | | | |

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**GTP for Bidders to Fill up**

| Lot 3 (Item 7-13)- Outdoor Termination kit | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| **Sl No.** | **Particulars** | **Unit** | **Bidders to Fill up** | | | | | | |
| | | | **OD Termination Kit 1x630sqmm 11kV** | **OD Termination Kit 1x630sqmm 33kV** | **OD Termination Kit 3x150 sqmm 33kV** | **OD Termination Kit 1x150 sqmm 33kV** | **ID Termination Kit 3x185 sqmm 33kV** | **ID Termination Kit 3x300 sqmm 11kV** | **ID Termination Kit 3x300 sqmm 33kV** |
| 1 | **Type** | | | | | | | | |
| 2 | Applicable Standards | | | | | | | | |
| 3 | Rated Voltage U/Uo(Um) | kV | | | | | | | |
| 4 | AC Voltage withstand | kV(1min) | | | | | | | |
| | Dry | | | | | | | | |
| | Wet | | | | | | | | |
| 5 | Impulse voltage withstand(10 positive and 10 negative, 1.2us between each conductor and the ground screen) | kV | | | | | | | |
| 6 | Partial Discharge | kV | | | | | | | |
| 7 | Loading Cycle(60 cycle 5h heating, 3h cooling conductor temperature: 5+operating temperature) | | | | | | | | |
| | Kit Particulars | | | | | | | | |
| 8 | Materials of the tubing/moulded part | | | | | | | | |
| 9 | Method of stress control | | | | | | | | |
| 10 | Method of environment seal | | | | | | | | |
| 11 | Allowable Kit storage temperature | Degree | | | | | | | |
| 12 | All the jointing kits(outdoor/indoor/straight through joint kit)is complete with all accessories | (Yes/No) | | | | | | | |

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**GTP for Bidders to Fill up**

| Lot 3 (Item 4-20): Outdoor Termination kit | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| **Sl No.** | **Particulars** | **Unit** | **Bidders to Fill up** | | | | | | |
| | | | **Straight Through Jointing Kit for 3x150 sq.mm, 33 kV** | **Straight Through Jointing Kit for 4x400 sq.mm, 1.1 kV** | **Straight Through Jointing Kit for 4x300 sq.mm, 1.1 kV** | **Straight Through Jointing Kit for 4x150 sq.mm, 1.1 kV** | **Straight Through Jointing Kit for 4x70 sq.mm, 1.1 kV** | **Straight Through Jointing Kit for 4x35 sq.mm, 1.1 kV** | **Straight Through Jointing Kit for 2x6 sq.mm, 1.1 kV** |
| 1 | **Type** | | | | | | | | |
| 2 | Applicable Standards | | | | | | | | |
| 3 | Rated Voltage U/Uo(Um) | kV | | | | | | | |
| 4 | AC Voltage withstand | kV(1min) | | | | | | | |
| | Dry | | | | | | | | |
| | Wet | | | | | | | | |
| 5 | Impulse voltage withstand(10 positive and 10 negative, 1.2us between each conductor and the ground screen) | kV | | | | | | | |
| 6 | Partial Discharge | kV | | | | | | | |
| 7 | Loading Cycle(60 cycle 5h heating, 3h cooling conductor temperature: 5+operating temperature) | | | | | | | | |
| | Kit Particulars | | | | | | | | |
| 8 | Materials of the tubing/moulded part | | | | | | | | |
| 9 | Method of stress control | | | | | | | | |
| 10 | Method of environment seal | | | | | | | | |
| 11 | Allowable Kit storage temperature | Degree | | | | | | | |
| 12 | All the jointing kits(outdoor/indoor/straight through joint kit)is complete with all accessories | (Yes/No) | | | | | | | |

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Bhutan Power Corporations Limited

## Lot No. 3: Cable Jointing Kits

| Sl No. | Materials Description | UoM | Qty | Offered Brand and Country of Origin | Unit Rate in DDP (Nu.) | Amount in DDP (Nu.) |
|---|---|---|---|---|---|---|
| 1 | ID Termination Kit 1x630sqmm 11kV | NO | 3 | | | |
| 2 | ID Termination Kit 1x630sqmm 33kV | NO | 9 | | | |
| 3 | ID Termination kit for 3X150sqmm, 33kV | SET | 84 | | | |
| 4 | ID Termination kit for 3X185sqmm 33kV | SET | 2 | | | |
| 5 | ID Termination kit for 3X300sqmm 11kV | SET | 3 | | | |
| 6 | ID Termination kit for 3X300sqmm 33kV | NO | 5 | | | |
| 7 | OD Termination Kit 1x630sqmm 11kV | NO | 3 | | | |
| 8 | OD Termination Kit 1x630sqmm XLPE 33kV | NO | 9 | | | |
| 9 | OD Termination kit for 3X150 sqmm, 33kV | SET | 10 | | | |
| 10 | OD Termination kit for 1X150 sqmm, 33kV | SET | 8 | | | |
| 11 | OD Termination kit for 3X185sqmm 33kV | SET | 2 | | | |
| 12 | OD Termination kit for 3X300sqmm 11kV | SET | 3 | | | |
| 13 | OD Termination kit for 3X300sqmm 33kV | SET | 7 | | | |
| 14 | Straight Through Jointing Kit for 3x150 sq.mm, 33 kV | SET | 90 | | | |
| 15 | Straight Through Jointing Kit for 4x400 sq.mm,1.1 kV | SET | 20 | | | |
| 16 | Straight Through Jointing Kit for 4x300 sq.mm,1.1 kV | SET | 58 | | | |
| 17 | Straight Through Jointing Kit for 4x150 sq.mm,1.1 kV | SET | 9 | | | |
| 18 | Straight Through Jointing Kit for 4x70 sq.mm,1.1 kV | SET | 11 | | | |
| 19 | Straight Through Jointing Kit for 4x35 sq.mm,1.1 kV | SET | 19 | | | |
| 20 | Straight Through Jointing Kit for 2x6 sq.mm,1.1 kV | SET | 9 | | | |
| **Total Amount (Nu.)** | | | | | | |

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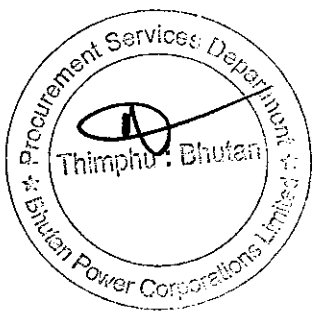
# Technical Specification for Lot 4 (Transformer Oil)



## 1. Transformer Oil

1.1 The insulating oil shall conform to all parameters either as per IEC-60296 and IS 335 or as specified below, while tested at supplier's premises. No inhibitors shall be used in oil. The supplier shall furnish test certificates from the supplier against their acceptance norms as mentioned below, prior to despatch of oil from refinery to site.

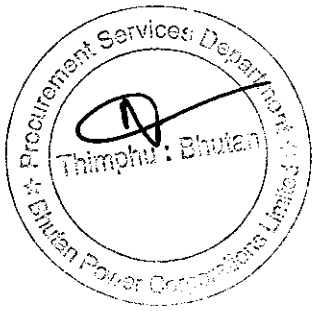
| Sl. No. | Characteristics | Requirements | Method of Test |
|---|---|---|---|
| 1 | Appearance | The oil shall be clear and transparent and free from suspended matter or sediment | A representative sample of the oil shall be examined in a 100 mm thick layer, at ambient |
| 2 | Density at 29.5°C (max.) | 0.89 gm/cm3 | IS: 1448 |
| 3 | Kinematic Viscocity at27°C (Max.) | 27 cSt | IS: 1448 |
| 4 | Interfacial Tension at27°C (Min.) | 0.04 N/m | IS: 6104 |
| 5 | Flash point Penskey-Marten (closed) (Min.) | 140°C | IS: 1448 |
| 6 | Pour point (Max.) | -30°C | IS: 1448 |
| 7 | Neutralization value (total acidity) (Max.) | 0.03 mg KOH/gm | IS: 335 Appendix-1 |
| 8 | Corrosive sulphur (in terms of Classification Of copper strip) | Non-Corrosive | IS: 335 Appendix-1 |
| 9 | Electric strength (Breakdown voltage) (Min.) | | |
| a) | New untreated oil | 30 kV (rms) (if this value is not attained the oil shall be treated) | IS: 6792 |
| b) | After Treatment | 60 kV (rms) | - |

| Sl# | Characteristics | Requirements | Method of Test |
|---|---|---|---|
| 10 | Resistivity (Min.) (ohm cm) | | IS: 6103 |
| b) | at 27°C | $1500x10^{12}$ | |
| 11 | Oxidation stability | | |
| a) | Neutralization value after oxidation (Max.) | 0.40 mg KOH/gm | |
| b) | Total sludge after oxidation (Max) | 0.10 percent by weight | |
| 12 | Presence of oxidation inhibitor | The oil shall not contain anti-oxidant additives | IS: 335 Appendix-D |
| 13 | Water content (Max.) | | |
| a) | New untreated oil | 50ppm | IS: 2362 |
| b) | After treatment | 15ppm | IS: 1866 |
| 14 | Aging Characteristics after 96hrs as per ASTM-D1934/IS: 12177 with catalyst (Copper) | | |
| a) | Resistivity(Min) (ohm cm)<br>at 27°C<br>at 90°C | <br>$2.5x10^{12}$<br>$0.2x10^{12}$ | |
| b) | Tan delta at 90°C (Max.) | 0.2 | |
| c) | Total acidity (Max.) | 0.05 mg KOH/gm | |
| d) | Sludge content wt. (Max.) | 0.05 %( By weight) | |
| 15 | PCB Content | Less than 2 ppm | |

1.2 Subsequently oil samples shall be drawn

(i) Prior to filling in main tank at site and shall be tested for:

(1) BDV.
(2) Moisture content.



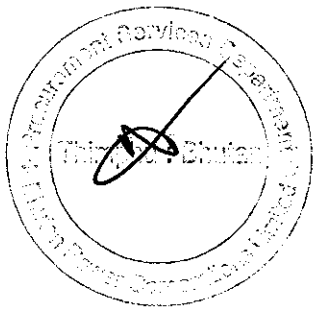
(ii) Prior to energisation at site and shall be tested for following properties & acceptance norms:

| | | |
|---|---|---|
| (1) | BDV (kV rms) | 60 kV (min.) |
| (2) | Moisture content | 15 ppm (max.) |
| (3) | Tan-delta at 90°C | 0.05 (max.) |
| (4) | Resistivity at 90°C | 1 x $10^{12}$ ohm-cm (min.) |
| (5) | Interfacial Tension | 0.03 N/m (min.) |

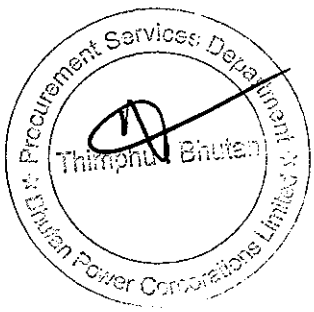
1.3 At manufacturer's works oil sample shall be drawn before and after heat run test and shall be tested for following:

| | | |
|---|---|---|
| (1) | BDV | 60 kV (min.) |
| (2) | Moisture content | 15 ppm |
| (3) | Dissolved gas analysis (DGA): | |

Samples for DGA shall be taken from sampling device within 24 hours prior to commencement of temperature rise test and immediately after this test. The acceptance norms with reference to various gas generation rates during the temperature rise test shall be as per IS: 10593 (based on IEC-599).

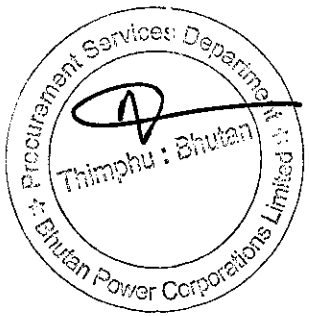


| Lot4: Transformer Oil | | | |
|---|---|---|---|
| **Sl. No.** | **Parameters** | **UoM** | **Bidders to fill up** |
| 1 | Appearance | | |
| 2 | Viscosity at 40°C | $mm^2/s$ | |
| 3 | Viscosity at -30°C | $mm^2/s$ | |
| 4 | Water content (Max) | | |
| a. | New untreated Oil | ppm | |
| b. | After treatment | ppm | |
| 5 | Flash point (Min) | oC | |
| 6 | Pour point (Max) | oC | |
| 7 | Neutralization value (Total acidity) (Max) | mg KOH/gm | |
| 8 | Corrosive Sulphur (In terms of class of Cu Strip) | | |
| 9 | Electric Strength (Breakdown voltage ) (Min) | | |
| a. | New Untreated Oil | kV (rms) | |
| b. | After Treatment | kV (rms) | |
| 10 | Dielectric dissipation factor (ten delta) at 90°C (Max) | | |
| 11 | Sludge (Max) | % | |
| 12 | PCB Content | ppm | |
| 13 | PCA Content (Max) | % | |



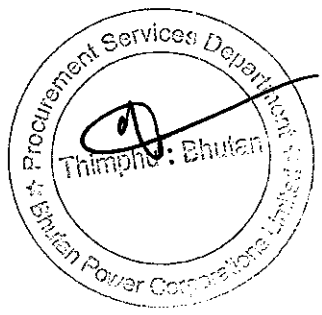
**Lot No. 4: Transformer Oil**

| Sl. No. | Materials Description | UoM | Qty | Offered Brand and Country of Origin | Unit Rate in DDP (Nu.) | Amount in DDP (Nu.) |
|---|---|---|---|---|---|---|
| 1 | Transformer oil | L | 16,800 | | | |



# Technical Specification for Lot 5 (Lugs and Compression Glands)

**Refer Price Schedule.**



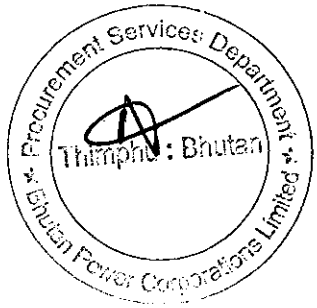
## Lot No. 5: Lugs and Compression Glands

| Sl No. | Materials Description | UoM | Qty | Offered Brand and Country of Origin | Unit Rate in DDP (Nu.) | Amount in DDP (Nu.) |
|---|---|---|---|---|---|---|
| 1 | Double Compression Gland for 2X6sqmm | SET | 74 | | | |
| 2 | Double Compression Gland for 4X150sqmm | SET | 102 | | | |
| 3 | Double Compression Gland for 4X300sqmm | SET | 478 | | | |
| 4 | Double Compression Gland for 4X35sqmm | SET | 166 | | | |
| 5 | Double Compression Gland for 4X400sqmm | SET | 190 | | | |
| 6 | Double Compression Gland for 4X70sqmm | SET | 90 | | | |
| 7 | Terminal lugs for 4 core 35sqmm UG cable | NO | 872 | | | |
| 8 | Terminal lugs for 4 core 70sqmm UG cable | NO | 360 | | | |
| 9 | Terminal lugs for 4core 150sqmm UG cable | NO | 408 | | | |
| 10 | Terminal lugs for 4core 400sqmm UG cable | NO | 760 | | | |
| 11 | Al.Terminal Lugs for 300Sqmm | NO | 1912 | | | |
| 12 | Al.Terminal Lugs for 6 sqmm | NO | 296 | | | |
| **Total Amount (Nu.)** | | | | | | |

Procurement Services Department
Bhutan Power Corporations Limited
Thimphu, Bhutan

# Technical Specification for Lot 6 (Battery Bank with Charger)

**(The Technical Specification is given in Price Schedule)**

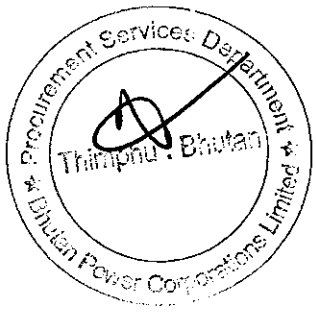


| Lot No. 6: Battery Bank with Charger | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Sl. No.** | **Materials Description** | **Technical Specifiction** | **UoM** | **Qty** | **Offered Brand and Country of Origin** | **Unit Rate in DDP (Nu.)** | **Amount in DDP (Nu.)** |
| 1 | 110V Battery Bank with Charger | 110V DC, 200AH capacity battery bank along with float cum boost charger (FCBC); 2V per cell (55 Nos. Cells), VRLA type batteries (maintenance free batteries) along with complete set of all its accessories. Input: 415V AC, three phase, 50Hz. charging current: 50A; Output volage: 110VDC. Preferred make: AMARA RAJA, India. | SET | 1 | | | |
| 2 | 48V Battery Bank with Charger | 48V DC, 100AH capacity battery bank with float cum boost charger (FCBC), Batteries 2V per cell (24 nos. Cells) VRLA type batteries. output voltage: 48V DC, Capacity@10 at 27°C :100AH, Cell Type: 2V-100AH, Float voltage: 53.52V, Boost Voltage:55.20V, Max. charging current: 20A, Max.allowable ripple: 2%rms, along with complete set of all its accessories; Input: 415V AC, three phase 50Hz. Output volage: 110VDC. Preferred make: Amara Raja,India. | SET | 1 | | | |
| **Total Amount (Nu.)** | | | | | | | |

Procurement Services Department
Bhutan Power Corporations Limited
Thimphu : Bhutan

# Technical Specification for Lot 7 (Miscellaneous)

**(The technical Specification is mentioned in Price Schedule)**

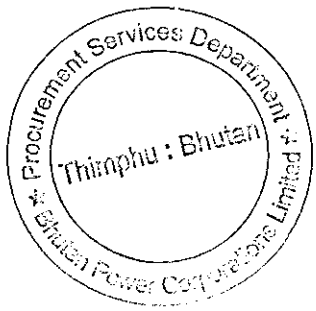


**Lot No. 7: Miscellaneous**

| Sl. No | Materials Description | Technical Specifiction | UoM | Qty | Offered Brand and Country of Origin | Unit Rate in DDP (Nu.) | Amount in DDP (Nu.) |
|---|---|---|---|---|---|---|---|
| 1 | Aviation Ball (AWS) 220&66kV Al. alloy 1.2 | Fibre glass polymer hot moulding under pressure, Diameter of sphere 600±5mm, Weight 5.7kg±5% (Excluding mounting accessories), Weight of FRP Sleeves and side clamps N&B 0.51kG, Weight of 8 set 10x50 Hex bolt with spring washer & lock Nut 0.4KG. Bolts & Nuts of stainless steel, Additional side clamps of galvanised iron; colour of sphere: half white & half international orange. | NO | 10 | | | |
| 2 | Breather for 5MVA Transformer, Capacity 2 kg | Silica gel breather for 5MVA, 66/11kV Power Transformer; breather capacity = 2kg, breather mounting flange details: outer dia. 120mm, inner dia. 30mm, 4 nuts & bolts mounting holes at distance of 60mm between adjacent holes and 85mm between opposite holes; Sigica gel breather color - blue | NO | 8 | | | |
| 3 | Breather for 5MVA Transformer, Capacity 1 kg | Silica gel breather for 5MVA, 66/33kV Power Transformer; breather capacity = 1kg, breather mounting flange details: outer dia. 80mm, inner dia. 20mm, 4 nuts & bolts mounting holes at distance 40mm between adjacent holes and 60mm between opposite holes; Sigica gel breather color - blue | NO | 4 | | | |
| 4 | Breather for 66/11,10 MVA Transformer | Silica gel breather for 10MVA, 66/33kV Power Transformer; breather capacity = 2.5kg, breather mounting flange details: outer dia. 115mm, inner dia. 32mm, 4 nuts & bolts mounting holes at distance of 60mm between adjacent holes and 85mm between opposite holes; Sigica gel breather color - blue | NO | 6 | | | |
| 5 | Breather for 66/33,8 MVA Transformer | Silica gel breather for 8MVA, 66/33kV Power Transformer; breather capacity = 4kg, thread type mounting- dia. 34mm; Sigica gel breather color - blue | NO | 2 | | | |
| 6 | Parallel Groove Clamp (Panthar) | 3 bolted, PG clamp, material: Aluminum, suitable to use for ACSR pantther conductor with overall conducto dia. 21.0mm, Aluminum: 30/3mm & steel: 7/3mm. | NO | 5 | | | |
| 7 | Parallel Groove Clamp (Zebra) | 4 bolted, PG clamp, material: Aluminum, suitable to use for ACSR pantther conductor with overall conductor dia. 28.62mm, Aluminum: 54/3.18mm & steel: 7/3.18mm. | NO | 5 | | | |
| 8 | T clamp: Zebra to Zebra conductor | T-Clamp for ACR Zebra to Zebra conductor, Material: Aluminum; Type of Clamp: T Clamp, 12 bolts type; Corrosion Resistant; Frequency: 50 Hz | NO | 20 | | | |
| 9 | T-Clamp For wolf Conductor | T- clamp for ACSR wolf-wolf conductor, Material: Aluminum; Type of Clamp: T Clamp, 12 bolts type; Corrosion Resistant; Frequency: 50 Hz. | NO | 20 | | | |
| 10 | Super enameled cu wire,20 SWG | Super enameled copper wire,20 SWG | KG | 200 | | | |
| | | **Total Lot Amount (Nu.)** | | | | | |

Bhutan Power Corporation Limited

# Technical Specifications for Lot 8 (Auto Recloser Circuit Breaker)



## 1. Scope

- The specification covers the design, manufacturing, testing, supply and delivery of SCADA compatible Auto Recloser Circuit Breaker (ARCB also called as Auto Recloser) suitable for 3-phase 11kV and 33kV with bidirectional communication facility.
- For Local Communication/configuration via craft terminal or Hand-Held-Unit (HHU), the ARCBs shall have serial/TCP-IP port for communication. For remote communication the ARCBs shall have TCP/IP (Ethernet) port(s) in congruent with IEC 60870-5-104 to facilitate communication with Control center / Data Concentrator Unit (DCU) / MDAS.
- Each Auto Recloser shall include programmable protection features and integrated remote operation capability that are intended for installation on 11kV and 33kV feeders to facilitate complete distribution automation.
- The Auto Recloser shall be along with appropriate lightning arrestor at upstream as well as downstream terminals.
- The Auto Recloser shall either have its own power supply supplied or an auxiliary power supply by single phase dry type resin cast transformer. A rechargeable battery and battery charger should also be provided to provide stable power source to the controller and other communication equipment. The battery must be easily available in the market and specially designed or vendor specific battery will not be accepted.
- Auto Recloser shall be connected to its controller using suitable connector by means of umbilical cable or equivalent cable. The bidder should provide hardware and clamping structures, conductors and lighting arrestors wherever required.
- The vacuum interrupter shall be versatile to trip or close based on capability of interruption and it should be fully sealed in solid dielectric housing for lifetime of the recloser. Recloser shall be provided with magnetic actuator with all accessories in order to facilitate operation of the reclosers.

## 2. Standards applicable for ARCB

Unless otherwise specified elsewhere in this specification, the performance and testing of the Auto Reclosers shall conform to the following International Standards and all related International standards to be read with up to-date and latest amendments/revisions, thereof:

| Sl. # | Standard No. | Title |
|---|---|---|
| 1 | IEC 62271 – 111 | Overhead, pad mounted, dry vault and submersible automatic circuit reclosers and fault interrupters for alternating current systems up to 38kV |
| 2 | IEC 62271 – 200 | AC Metal-enclosed switchgear and control gear for rated voltages above 1kV and up to and including 52kV |
| 3 | IEC 60255 | Electrical Relay standards |
| 4 | IEC 60529 | Degree of protection provided by enclosures |
| 5 | IEC 61000-4-2 | Electrostatic Discharge standard |
| 6 | IEC 61000-4-3 | Radiated electromagnetic field |
| 7 | IEC 61000-4-4 | Electrical fast transient/burst immunity test |
| 8 | IEC 61000-4-5 | Surge immunity |
| 9 | IEC 61000-4-6 | Immunity to Conduced Disturbances |
| 10 | IEC 61000-4-8 | Power Frequency Magnetic Field |
| 11 | IEC 61000-4-11 | Voltage dips, short interruptions and voltage variations immunity tests |
| 12 | IEC 61000-4-16 | Conducted common mode disturbances |
| 13 | IEC 61000-4-18 | Damped oscillatory wave |
| 14 | IEC 68-2-6 | Vibration in three axes |

## 3. Environmental conditions

All materials supplied shall be capable of operating under following environmental conditions.

| Sl No. | Particulars | Unit | Value |
|---|---|---|---|
| 1 | Minimum ambient temperature | °C | -20 |
| 2 | Maximum ambient temperature | °C | 40 |
| 3 | Relative humidity | % | 0 to 100 |
| 4 | Altitude | meters above sea level | At least 3000 |

## 4. General operating parameters

General operating parameters required for the Auto Reclosers are as shown in the table below

| Sl # | Particulars | 33kV | 11kV |
|---|---|---|---|
| 1 | Rated Voltage | 33kV | 11kV |
| 2 | Maximum system voltage | 36kV | 12kV |
| 3 | Applicable Standard | IEC 62271 – 111 | |
| 4 | Type | Outdoor, pole mounted | |
| 5 | Frequency | 50 Hz | |
| 6 | Rated Power Frequency withstand Voltage (kV) | 70 | 28 |
| 7 | Rated Lightning impulse withstand Voltage (kV) | 170 | 75 |
| 8 | Rated continuous current(Amps) | 400 | 400 |
| 9 | Fault make capacity (RMS)-kA | Minimum of 12.5 | Minimum of 12.5 |
| 10 | Fault make capacity (Peak )-kA | Minimum of 31.5 | Minimum of 31.5 |
| 11 | Fault breaking capacity (kA) | Minimum of 12.5 | Minimum of 12.5 |
| 12 | Protection Features | Overcurrent | Overcurrent |
| | | Earth fault | Earth fault |
| | | Sensitive Earth Fault | Sensitive Earth Fault |
| | | Negative phase sequence | Negative phase sequence |
| | | Over/Under frequency | Over/Under frequency |
| | | Over/Under Voltage | Over/Under Voltage |
| | | Live load blocking | Live load blocking |
| | | Cold load pick up | Cold load pick up |
| | | Inrush restraints | Inrush restraints |
| 13 | Metering/Measurement features | Voltage | Voltage |
| | | Current | Current |

| | | | |
|---|---|---|---|
| | | Frequency | Frequency |
| | | Kilowatt (kW) | Kilowatt (kW) |
| | | Apparent Power (kVA) | Apparent Power (kVA) |
| | | Reactive power (kVAR) | Reactive power (kVAR) |
| | | Power Factor | Power Factor |
| | | Energy (kwh) | Energy (kwh) |
| | | Outage Measurement | Outage Measurement |
| 14 | Communication features | Local: Serial/TCP/IP and USB port | Local: Serial/TCP/IP and USB port |
| | | Remote: TCP/IP | Remote: TCP/IP |
| 15 | Interrupting medium | Vacuum | Vacuum |
| 16 | Insulation | Solid Di-electric material | Solid Di-electric material |
| 17 | Mechanical operating life | Minimum of 10,000 operations | |

***Above values are the standard values at 1000 meters ASL. For installing at an altitude higher than 1000 m, the insulation withstand level of external insulation and the clearances shall be defined by the bidder considering altitude correction factor in accordance with an altitude as given in Clause no. 3 (Environmental Conditions) above.***

## 5. Testing

### 5.1 Type Tests & Test Certificates

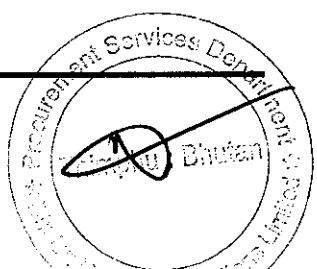
ARCBs or Auto Reclosers shall be type tested for all the type tests as per applicable international standard in an accredited lab within last 10 years from the date of bid opening.

Bidder shall submit, along with tender, all Type Test Certificates as per international standards including **immunity to magnetic field** as per international standards with relevant amendments.

### 5.2 Routine & Acceptance Tests

The Factory Acceptance and Routine tests shall be carried out as per applicable international standards in presence of purchaser or her representatives. Apart from above test Auto Recloser shall also be tested for all functional requirement through communication as part of acceptance test.





### 6. Mounting features of Auto Reclosers

The Auto Recloser shall be suitable for mounting on existing poles of the distribution network and suitable mounting bracket shall be provided with appropriate lifting lug provided at appropriate position. There should be suitable mounting brackets for surge arrestor as well and all associated nut and bolts shall be galvanized. The terminals or bushings of Auto Recloser shall have laser cut markings indicating incomer side and load side. Means shall be provided to permit manual operation of the Auto Recloser through operating rod or built in extensible lever system from the ground level.

### 7. Bushing terminals

The material for bushing shall be outdoor Cycloaliphatic epoxy resin / hydrophobic Cycle aliphatic epoxy / HECP and preferred arrangement for connection to overhead conductor is using crimp lugs with holes. There shall be encapsulated CVTs for voltage measurement on bushings required for auto-reconfiguration of the network and CT for current measurement and protection. All components of the equipment shall be de-rated as per applicable international standards.

### 8. Finish

All interior and exterior ferrous surfaces of Auto Recloser and control cabinets shall be manufactured from 304 or better grade stainless steel.

### 9. Switching Equipment

9.1 The pole mounted outdoor type ARCB shall have Current Transformer, Capacitive Voltage Transformer and vacuum interrupter contained in the outdoor circuit switching unit.

9.2 The current transformer shall be as per applicable international standards with appropriate ratio of 300/1A for 11kV and 150/1 for 33kV with 5P protection accuracy class. This shall be able to detect and record the lowest line current in a rural feeder at any instant of time. A capacitive voltage transformer meeting service requirements as per international standard shall be available to measure the voltage.

9.3 There shall be manual trip / close or lock options provided externally in the events of faults or line maintenance. The supplier or manufacturer shall also supply properly insulated hotstick or any items required for manual operation.

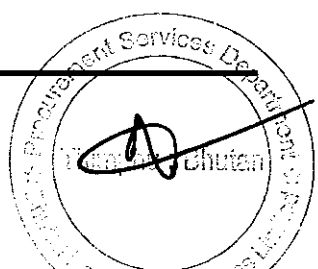
9.4 The ARCB shall be provided with position indicator, or other suitable means, which will clearly indicate the position OFF and ON and the indicator shall be visible from the ground.

9.5 All accessories required for switching components shall be supplied

**10. Control Equipment**

1. The pole mounted weather proof outdoor control cabinet for Auto Recloser shall be manufactured from 304 or better grade stainless steel and it should house battery, battery charger, switches, relay and other required communication equipment.
2. The control cabinet shall be connected to the Auto Recloser with multi-pin weatherproof connector using 5 meters long umbilical cable or equivalent or ultraviolet-resistant cable. It should be possible to disconnect the cable when recloser is connected to power system, without causing damage or malfunction.
3. Control cabinet shall be adequately sealed with ingress protection rating of IP55 or better.
4. The supplier shall ensure that the equipment housed in the control cabinet can withstand the heating effect of direct solar radiation without causing failure and/or malfunction.
5. Cabinet shall be with additional provision for bottom entry of three cables and all holes shall be pre-punched and suitably blanked off. There should be another provision of bottom entry for the cable connect to Auto Recloser.
6. The cabinet shall have ventilation holes to avoid hydrogen build-up inside the cabinet.
7. The door of the cabinet shall be fitted with a secure and robust locking arrangement and there should be minimum of two latching points. The door shall be removable for replacement at site and door stay shall be fitted to keep door open while operators are attending the unit.
8. There shall not have any sharp edges and there shall not be any danger of pinching or guillotining an operator's fingers or hands inside the cabinet.





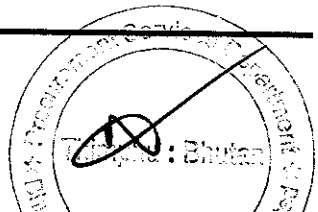
9. All connections that could potentially expose the operator to dangerous voltages will be shielded as per applicable standards. These connections shall include the terminals used for current transformers, primary power supply and voltage measurement inputs.
10. The controller, upon opening of panel's door, shall also have separate push button for manual trip and close of the Auto Recloser from control panel.
11. The controller shall be equipped with standard size Liquid Crystal Display to access
    - Close/open operation log
    - View configuration or setting
    - View event log and messages
    - View, modify and change configuration or setting
12 There shall be toggle buttons available to select, move up, move down, move left and move right. There shall also be local/remote selector button available with the controller.

## 11. Protection characteristics

1. Protection element shall be provided with at least 4 independent protection group settings. Protection should at least include following features.

| Sl. No. | Protection type |
|---|---|
| 1 | Phase Instantaneous overcurrent |
| 2 | Earth Instantaneous overcurrent |
| 3 | Phase time overcurrent |
| 4 | Earth time overcurrent |
| 5 | Sensitive Earth Fault |
| 6 | Negative phase sequence(Broken conductor) |
| 7 | Over/Under frequency |
| 8 | Over/Under Voltage |
| 9 | Live load blocking |
| 10 | Cold load pick up |
| 11 | Inrush restraints |
| 12 | Loss of supply |
| 13 | Directional blocking |





| | |
|---|---|
| 14 | Loop automation |

2 The ratio of drop-off current to pick-up current shall be at least 95 % for all protection functions.

3 The E/F and SEF functions shall be equipped with harmonic filtering to prevent operation when harmonics are present in the primary residual earth currents

4 All protection functions, i.e. over-current (O/C), earth fault (E/F) and sensitive earth fault (SEF) shall have elements with characteristics that comply with IEC 255.

5 All the basic protection parameters shall be provided with Standard inverse (SI), very inverse (VI) or extremely inverse (El), definite time curve.

6 In addition to above, provision for at least four customer programmable curves shall be provided.

7 Loss of supply (LOP) on all three phases shall not generate the protection trip. There shall be facility to turn LOP ON or OFF without affecting other protection functions of the device.

8 SEF a primary earth fault current of 4A to 20A in steps not exceeding 1A shall be detectable. Delayed protection operation shall be possible by selecting a definite time protection element with time delay from 0s to 25s, in 1s steps.

9 The AR shall have minimum 4 independent protection groups. The Protection Groups shall have clear indication and shall be marked as "I, II, III, IV" or "A, B, C, D" or "1, 2, 3, 4".

10 Each protection group shall have the facility to configure O/C, E/F and SEF trip current and specify the number of the protection trips independently from others.

11 Changes to any of the protection parameter to any of the not active protection group shall not affect the protection functionality of the active protection group.

12 Information about activation of any of the protection group shall be recorded in history and shall be easily assessable. Information about protection trip shall clearly indicate the protection group, active at the time of fault.

13 Automatic Protection Group Selection shall have the facility to be turned ON or OFF with password protection or other form of access control.

**12. Auto Recloser Operation parameter**

1. The number of sequential trips to reach lockout shall be selectable to be either 1, 2, 3 or 4.
2. Reset times shall ideally be separately selectable for SEF and the combination of over-current and earth fault functions. The reset time shall be selectable from 5s to 120s in 1s steps.
3. The dead time between each successive recloser shall be independently selectable from instantaneous to 5s for the first recloser and from a minimum of 2s up to a maximum of 120s for subsequent reclosers.
4. A close instruction initiated locally or remotely during a dead time shall result in lockout if the fault is still present upon closure.
5. Software required for any components shall be provided without any additional cost.

**13. Auto Recloser Measurement characteristics**

1 Measurement of following parameters shall be done either by three phase 3 wire method or three phase 4 wire method

| Sl. No. | Measurement values |
|---|---|
| 1 | Phase Voltage |
| 2 | Line Voltage |
| 3 | Phase Current |
| 4 | Frequency |
| 5 | Active power (kW) |
| 6 | Apparent Power (kVA) |
| 7 | Reactive power (kVAR) |
| 8 | Power Factor |
| 9 | Energy (kwh) |
| 10 | Daily Peak Load |

2 The number and duration of outages shall be recorded and should be accessible locally or remotely using SCADA system.

**14. Local Engineering**

1. The Auto Recloser controller shall have a real time clock with leap year taken into account and the clock should be settable both locally and remotely.

2. A facility for selecting all the protection, operating and communications characteristics shall be locally available in the control cabinet. Optional password protection against unauthorized changes shall be available.

3 The controller shall be provided with non-volatile memory storage that shall have capacity to store at least 3000 logs. The log shall be including, but not limited to, all operating, protection and communication parameters, event recording of at least 3000 events, all changes in setting and measurement values

4 A pointer shall be provided to indicate up to where the data was last read. This will enable regular uploading or downloading of the data without re-loading of previously read data.

5 All events shall be time and date stamped with a resolution of at least 10 ms relative to the onboard real time clock.

6 The Auto Recloser shall be provided with position indicator, or other suitable means, which will clearly indicate the position OFF and ON and the indicator shall be visible from the ground.

**15. Tele control and communication**

1 The AR controller shall detect and report disconnection of the control cable between the controller and AR.

2 It shall be possible to operate AR, change the active protection group, turn Auto-Recloser capabilities ON/OFF and turn E/F and SEF ON/OFF remotely using the protocol specified.

3 As a minimum, one serial communication port& one Ethernet communication ports that allow for simultaneous operation shall be provided.

4 A USB port shall be provided for upgradation of firmware.

5 The protocol to be supported by the AR controller for remote communications shall be IEC 60870-5-104.

6 The software required for any equipment shall be provided without additional cost

**16. Power supply**

1 Power supply to the electronics, controller operation, operation of Auto Recloser and communication equipment shall be from auxiliary power source by use of dry type resin cast single phase 11000/230V or 33000/230V transformer.

2 Rechargeable Li-ion Battery/Lithium iron phosphate battery and constant voltage charger with current limiting shall be provided with Auto Recloser. The battery should be easily available in the market and specially designed battery or vendor specific battery will not be accepted. Battery standby time shall not be less than 24 hours and shall allow for a minimum of five (5) sequences of LRC trip-close operations. The battery shall recharge to 80 % of its capacity in a maximum of 15 hours. Battery low indication shall be available locally and remotely and minimum life expectancy of the battery shall be 5 years.

**17. Maintenance and commissioning**

1 All the communications equipment shall be easily accessible in the control cabinet. It shall be possible to perform secondary injection testing while the Auto Recloser is communicating with the center.

2 The AR shall not malfunction while the modem is transmitting via an antenna in close proximity and the control cabinet door is open

3 Provision shall be made in the control cabinet for individually isolating the power supply to/from the battery, Battery charger, Communication equipment and primary supply source to control cabinet

**18. Rating plate**

ARCBs shall bear a name plate clearly visible, effectively secured against removal and indelibly and distinctly marked in-accordance with international standard. In addition, the words **'Property of BPC'** along with the Purchase Order No. and year/month of manufacture, "Guarantee Years" shall either be punched or marked indelibly on the name plate.

**19. Training**

The supplier/manufacturer should arrange week long workshop or short course on setting, configuration, demonstration on setting up communication, installation and commissioning of ARCBs and all components before inspection. Only after the workshop or the course, inspection shall be carried out and the workshop or short course shall be free of cost to purchaser. The supplier or manufacturer shall propose appropriate solution to facilitate the workshop or short course in events of natural and unavoidable global catastrophe.

**20. Inspection**

20.1 The materials shall be subjected to all its routine inspections and tests as per relevant international standards. The supplier shall give the purchaser two weeks written notice of the materials being ready for testing. Unless the test is waived off, the purchaser shall attain such test on the scheduled date for which purchaser has been so notified or on a mutually agreed alternative date. If the purchaser fails to attain the testing on the mutually agreed date, supplier may proceed with the test which shall be deemed to have been made in the presence of purchaser and supplier shall forthwith forward to the purchaser duly certified copies of the test results.

20.2 The employer shall carry out inspection only upon completion of workshop or short course mentioned in Training section of this document.

20.3 The Inspecting Officer of the Employer will inspect the ARCBs as per sampling plan for acceptance test according to international standard. Apart from above test, the ARCBs shall also be tested for all functional requirement through communication as part of acceptance test. After testing, these sample shall be additionally sealed by the inspecting officer and one copy of the inspection report will be handed over to the manufacturer.

20.4 The supplier or manufacturer shall propose appropriate solution to facilitate the inspection in events of natural and unavoidable global catastrophe.

**21. Packing and Transportation**

The ARCBs shall be suitably packed for vertical/horizontal support to withstand handling during transport. The bidder shall be responsible for any damage during transit due to inadequate or improper packing. The ARCBs shall be packed appropriately to ensure safe transportation,

handling, identification and storage. All packing materials shall be environment friendly and not in conflict with law in force. The primary packing shall ensure protection against humidity, dust, grease and safeguard its performance until its installation. The secondary packing shall provide protection during transport. The packing case shall indicate "Fragile in nature" and direction of placement of box. Each packing shall indicate marking details like Manufacturer's name, Serial. No. of material, quantity, address of destination, etc.

The ARCBs shall not be exposed to undue shock and mishandling during transportation. The stacking of box inside transport media shall be such as to avoid their free movement. The packing should also be protected from rain and dust by transport media. The Bidder shall be responsible for any damage during transit due to inadequate or improper packing.

**22. Delivery**

2.1 All components of the equipment shall be delivered to Regional Stores Division, Phuentshogling, BPC.

2.2 Bidder shall dispatch the material, only after the successful completion of Routine Tests witnessed by the purchaser and after receiving written material dispatch clearance from purchaser.

**23. Submission of documents and diagrams**

The following information shall be submitted in following stages

| Sl. No | Particulars | Bid | Approval | Pre-Dispatch |
|---|---|---|---|---|
| 1 | Details of switching equipment | Required | | |
| 2 | Wiring diagram (GA and Schematic diagram) | | Required | |
| 3 | General arrangement for installation on double pole | | Required | |
| 4 | Procedures for maintenance and operation of all components | | | Required |
| 5 | Details of service history | Required | | |
| 6 | Guaranteed Technical Particulars (GTP) | Required | | |
| 7 | Deviation Sheet, if any | Required | | |
| 8 | List of software and accessories required for installation/configuration/operation. | Required | | |

| | | | | |
|---|---|---|---|---|
| 9 | Manufacturer's certification for quality standards and performance certificate | Required | | |
| 10 | Type Test reports | Required | | |
| 11 | Routine test reports with procedures | | Required | Required |
| 12 | Detailed manual for installation and commissioning instructions | | | Required |
| 13 | Details of lighting arrestor | Required | | |
| 14 | Details of battery | Required | | |
| 15 | Mounting details of control cabinet | | Required | |
| 16 | Mounting details of switching equipment | | Required | |
| 17 | Details of CT and CVT | Required | | |

## Annexure: Drawing of Existing Pole

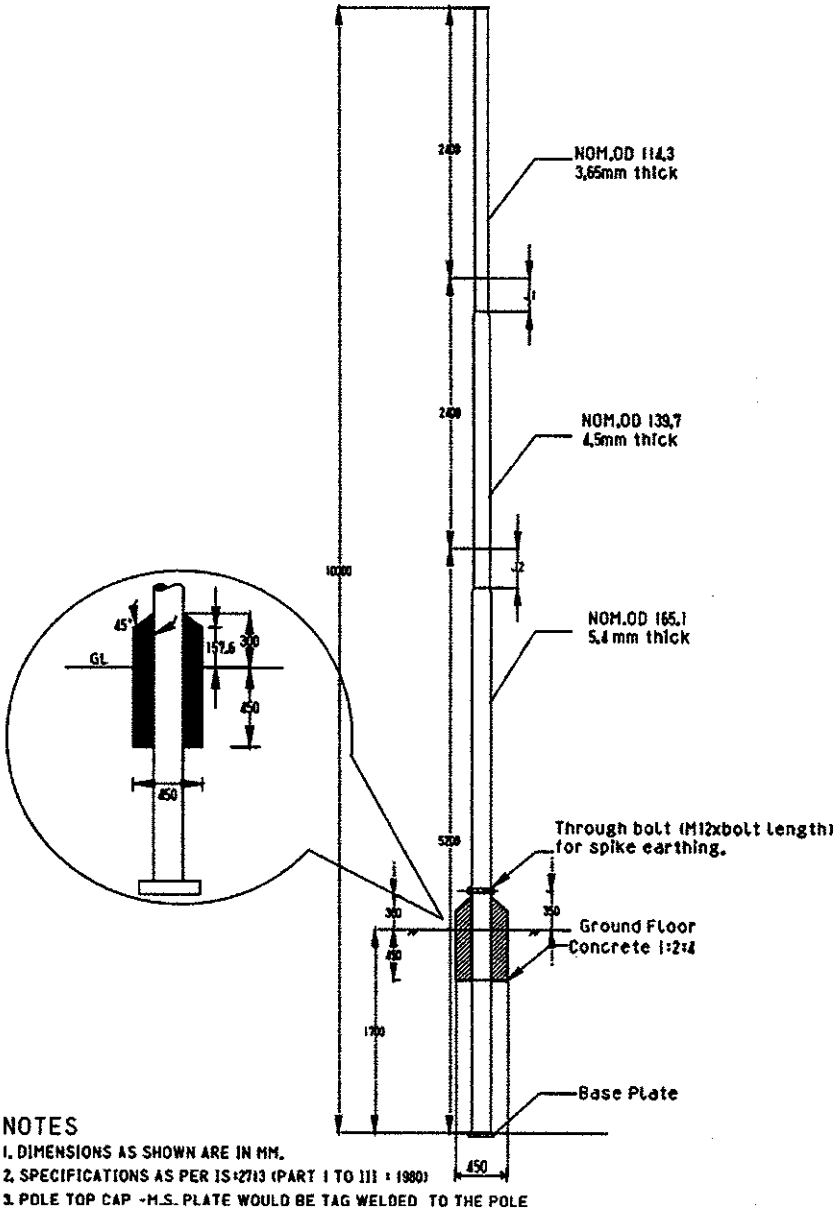
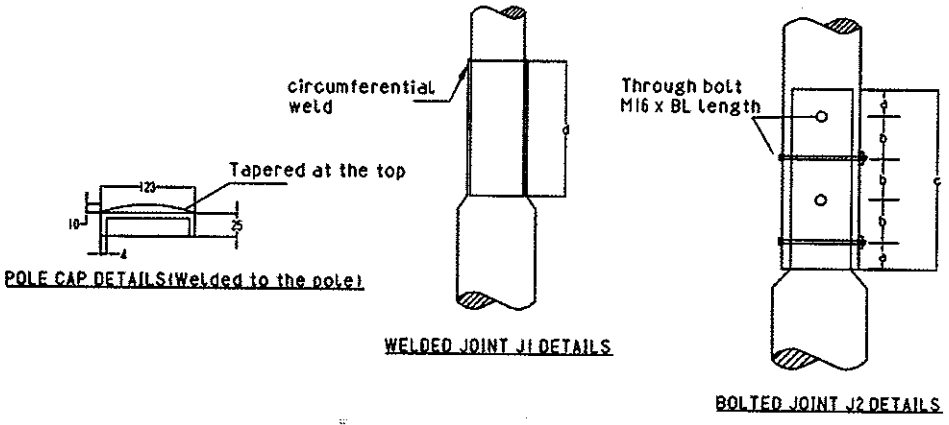


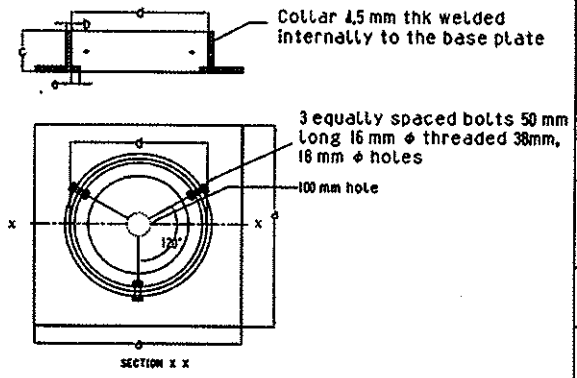

**Figure 1: Dimension of Single Steel Tubular Poles**




POLE CAP DETAILS(Welded to the pole)

WELDED JOINT J1 DETAILS

BOLTED JOINT J2 DETAILS



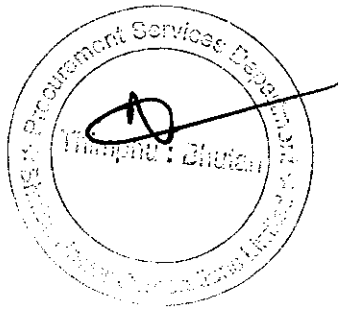

DETAILS OF MS BASE PLATE (Seperately packed)

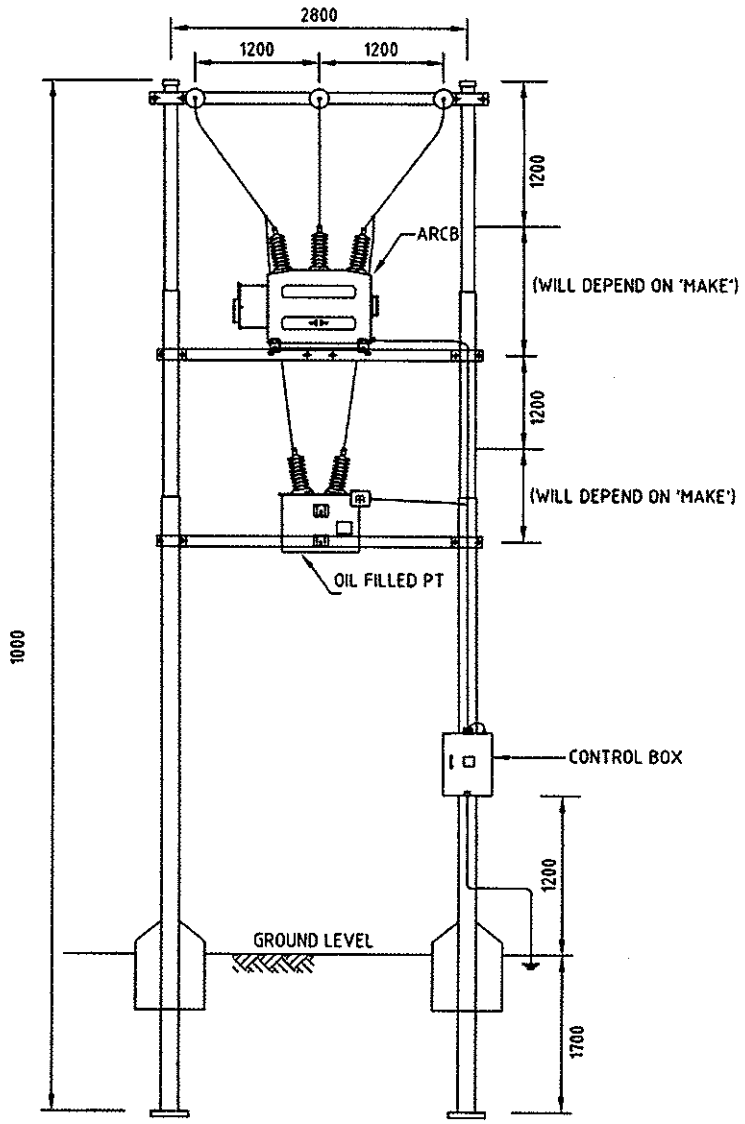
| Pole Type | | | 10 M (410-SP-45) |
|---|---|---|---|
| Length | | mm | 10000 |
| Top Segment | OD | mm | 114.3 |
| | Thickness | mm | 3.65 |
| | Length | mm | 2400 |
| Middle Segment | OD | mm | 139.7 |
| | Thickness | mm | 4.5 |
| | Length | mm | 2400 |
| Bottom Segment | OD | mm | 165.1 |
| | Thickness | mm | 5.4 |
| | Length | mm | 5200 |
| Joint J1 | Welded Joint | | |
| | d | mm | 300 |
| Joint J2 | a | mm | 55 |
| | b | mm | 80 |
| | c | mm | 350 |
| | BL | mm | 180 |
| Planting Depth | | mm | 1700 |
| Base plate details | a | mm | 250 |
| | b | mm | 6 |
| | c | mm | 70 |
| | d | mm | 165.1 |
| | e | mm | 10 |

NOTES

1. DIMENSIONS AS SHOWN ARE IN MM.
2. DRAWING NOT TO SCALE.
3. SPECIFICATIONS AS PER IS:2713 (PART I TO III : 1980)
4. POLE TOP CAP -M.S. PLATE WOULD BE TAG WELDED TO THE POLE

**Figure 2: Details of joints and other dimensions**






NOTES

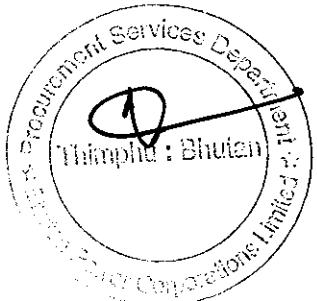
1. DIMENSIONS AS SHOWN ARE IN mm.
2. DRAWING IS NOT TO SCALE.

**Figure 3: Two single steel tubular poles used as double pole for installation of ARCB**

The supplier shall fill following table as a declaration of Guaranteed Technical Particular (GTP)

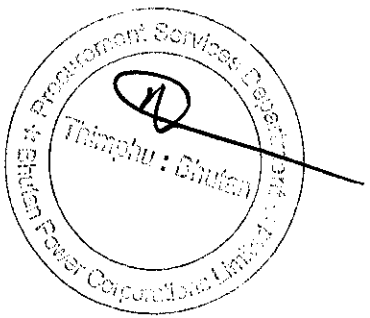
**Lot No. 8: Auto Recloser Circuit Breaker (ARCB)**

| Sl. No | Particulars | Unit | Bidders to Fill up | |
|---|---|---|---|---|
| | | | 11kV | 33kV |
| A. Environmental Condition | | | | |
| 1 | Minimum ambient temperature | Deg C | | |
| 2 | Maximum ambient temperature | Deg C | | |
| 3 | Relative humidity | % | | |
| 4 | Altitude | m above sea level | | |
| B. Switching Equipment | | | | |
| 1 | Rated power frequency withstand voltage (altitude corrected to 3500 meters) | kV | | |
| 2 | Rated lightning impulse withstand voltage (altitude corrected to 3500 meters) | kV | | |
| 3 | Rated continuous current | A | | |
| 4 | Fault make capacity (RMS) | kA | | |
| 5 | Fault make capacity (Peak) | kA | | |
| 6 | Fault breaking capacity | kA | | |
| 7 | Minimum mechanical life | Operations | | |
| 8 | Frequency | Hz | | |
| C. Control equipment | | | | |
| 1 | Minimum Degree of protection | | | |
| 2 | Material of cabinet | | | |
| 3 | Memory type | | | |
| 4 | Memory capacity | | | |
| D. Communication | | | | |
| 1 | Communication Protocol | | | |
| 2 | Communication ports available | | | |
| 3 | Minimum data transmission rate | Baud rate | | |
| | | Mbps | | |
| E. Power supply | | | | |
| 1 | PT voltage ratio | V | | |
| 2 | Minimum Battery life | Years | | |
| 3 | Battery make and model | | | |
| 4 | Battery type | | | |
| 5 | Battery charger type | | | |
| 6 | Battery charger make and model | | | |
| 7 | Input voltage | V | | |
| 8 | Output voltage | V | | |
| F. Lightning Arrestor | | | | |
| 1 | kV rating | kV | | |
| 2 | kA rating | kA | | |
| 3 | MCOV | kV | | |
| G. Current transformer | | | | |
| 1 | Primary current | A | | |
| 2 | Secondary current | A | | |
| 3 | Burden | VA | | |
| 4 | Accuracy class | | | |



**Lot No. 8: Auto Recloser Circuit Breaker (ARCB)**

| Sl. No. | Particulars | Unit | Qty | Offered Brand and Country of Origin | Unit Rate in DDP (Nu) | Amount in DDP (Nu) |
|---|---|---|---|---|---|---|
| 1 | Design, manufacturing, testing, supply and delivery of outdoor pole mounted SCADA compatible vacuum interrupter Auto Recloser and associated accessories suitable for line voltage of 11kV as per technical specification | Set | 3 | | | |
| 2 | Design, manufacturing, testing, supply and delivery of outdoor pole mounted SCADA compatible vacuum interrupter Auto Recloser and associated accessories suitable for line voltage of 33kV as per technical specification | Set | 2 | | | |
| **Total Lot Amount (Nu.)** | | | | | | |



# Technical Specifications
# for
# Lot 9 (Distribution Transformer Meters)

## 1. Scope

This specification covers the following for Single Phase Two Wire (240V, -/5A) static transformer operated watt hour and var hour smart grid ready meters of accuracy class 1.0 and Three Phase (415V, -/5A) static transformer operated watt hour and var hour smart grid ready meters of accuracy class 0.5 S with suitable meter box to house the meters.

a) Design, manufacture, testing at manufacturer works before dispatch, packing, delivery and submission of all documentation.
b) Tamper event detection, recording and reporting.
c) On demand reading capability.
d) Any accessories / hardware required for installation and operation for the meter.

In addition to supply and delivery of distribution transformer (DT) smart grid ready meters, Contractor shall design, supply, and deliver suitable resin cast ring type LT current transformer (CT) of accuracy class 0.5 for all the meters supplied in this project. The detailed technical specification and ratings of DTs are given in the ANNEXURE 'A'. The contractor may refer the same for appropriate design of CTs required for the meters.

## 2. Codes and Standards Applicable For Meters

Unless otherwise specified elsewhere in this specification, the performance and testing of the meters shall conform to the following International/Indian Standards and all related International/Indian standards to be read with up to-date and latest amendments/revisions, thereof:

| Sl. No | Standard | Description |
|---|---|---|
| 2.1 | IEC 60687 (1992 - 06) / IS - 14697 | AC Static Transformer Operated Watt-hour and Var-hour Meters, Class 0.2 S and 0.5 S |
| 2.2 | IEC Standard or IS - 16444 (Part 2) | AC Static Transformer Operated Watt-hour And Var-hour Smart Meters, Class 0.2 S, 0.5 S And 1.0 S Part 2 Specification Transformer Operated Smart Meters |
| 2.3 | IEC 62056 - 21 / IS - 15959 (Part 1) | Data Exchange for Meter Reading |
| 2.4 | IEC 62056 - 53 / IS - 15959 (Part 2) | Data Exchange for Meter Reading |
| 2.5 | IEC - 62052-11 | Electricity metering equipment (AC) - General requirements, tests and test conditions - Part 11: |

| | | |
|---|---|---|
| | | Metering equipment |
| 2.6 | IEC - 62053-21 | Electricity metering equipment (A.C) - Particular requirements - Part 21: Static meters for active energy (classes 1 and 2) |
| 2.7 | IEC - 62053-52 | Electricity metering equipment (AC) - Particular requirements - Part 52: Symbols |
| 2.8 | IEC - 62053-61 | Electricity metering equipment (A.C.) - Particular requirements - Part 61: Power consumption and voltage requirements |
| 2.9 | IEC 62058-11 | Electricity metering equipment (AC) - Acceptance inspection - Part 11: General acceptance inspection methods |
| 2.10 | IEC - 62058-31 | Electricity metering equipment (AC) - Acceptance inspection - Part 31: Particular requirements for static meters for active energy (classes 0,2 S, 0,5 S, 1 and 2) |
| 2.11 | IEC - 60736 | Testing Equipment for electrical Energy meter |
| 2.12 | IEC/IS/TR - 62051:Part 1:2004 | Electricity Metering - Data Exchange For Meter Reading, Glossary Of Terms Part 1 Terms Related To Data Exchange With metering Equipment Using DLMS/ COSEM |
| 2.13 | IEC - 62056-1-0:2014 | Smart metering standardisation framework |
| 2.14 | IEC - 62056-3-1:2013 | Use of local area networks on twisted pair with carrier signalling |
| 2.15 | IEC - 62056-4- 7:2014 | DLMS/COSEM transport layer for IP networks |
| 2.16 | IEC - 62056-5- 3:2017 | DLMS/COSEM application layer |
| 2.17 | IEC - 62056-6- 1:2017 | Object Identification System (OBIS) |
| 2.18 | IEC - 62056-6- 2:2017 | COSEM interface classes |
| 2.19 | IEC - 62056-6 - 9:2016 | Mapping between the Common Information Model message profiles (IEC 61968-9) and DLMS/COSEM (IEC 62056) data models and protocols |
| 2.20 | IEC - 62056-7- 5:2016 | Local data transmission profiles for Local Networks (LN) |
| 2.21 | IEC - 62056-7-6:2013 | The 3-layer, connection-oriented HDLC based communication profile |
| 2.22 | IEC - TS 62056-8-20:2016 | Mesh communication profile for neighbourhood networks |
| 2.23 | IEC - TS 62056-9-1:2016 | Communication profile using web-services to access a DLMS/COSEM server via a COSEM Access Service (CAS) |

| | | |
|---|---|---|
| 2.24 | IEC - 62056- 21:2002 | Direct local data exchange |
| 2.25 | DLMS - White Book | Glossary of DLMS/COSEM terms |
| 2.26 | DLMS - Blue Book | COSEM meter object model and the object identification system |
| 2.27 | DLMS - Green Book | Architecture and protocols to transport the model |
| 2.28 | DLMS - Yellow Book | Conformance testing process |

**Note:**

All kinds of tests, which are required for confirmation of above-mentioned standards, shall be carried out and test reports to be submitted with bid document.

### 3. System Data (Supply/Installation)

| Sl. No | Particulars | Description |
|---|---|---|
| 3.1 | Supply System | 1 Phase AC - 2 wire & 3 Phase AC - 4 wire |
| 3.2 | Voltage | 240V (phase to neutral) for single phase meters / 415V (phase to phase) for three phase meters with variation of minimum ± 6% |
| 3.3 | Frequency | 50 Hz with variation of minimum -2% & +1% |
| 3.4 | System Neutral | Solidly Earthed |

### 4. Service Conditions

The meters to be supplied against this specification should be capable of performing and maintaining required accuracy under extreme hot, cold, tropical monsoon and dusty climate. The meter shall be required to operate satisfactorily and continuously under the following tropical climatic conditions.

| Sl. No | Particulars | Description |
|---|---|---|
| 4.1 | Temperature Range | a) Operation range: -20 °C to +40 °C<br>b) Limit range of operation: -20 °C to +60 °C |
| 4.2 | Relative Humidity | 0 to 95% |
| 4.3 | Altitude | Minimum 3500 m |

## 5. General Technical Requirements

| SL. No | Particulars | Description |
|---|---|---|
| 5.1 | Meter Type | 1 - Ø, 2 wire and 3 - Ø, 4 wire static transformer operated smart grid ready Meter with Meter box and adequate space provision for future communication module installation. |
| 5.2 | Connection | Current Transformer Operated |
| 5.3 | Rated Voltage | 240V (phase to neutral)/ 415 (phase to phase) with variation of minimum ± 6%. However meter should withstand the maximum system voltage. |
| 5.4 | Rated Current | $I_b$ -5A and $I_{max}$ -10 A |
| 5.5 | Starting current | 0.1 % of base current |
| 5.6 | Rated Frequency | 50Hz with variation of minimum -2% & +1% |
| 5.7 | Accuracy Class | Accuracy class 1 for single phase and accuracy class of 0.5s for three phase Transformer Operated DT Meter |
| 5.8 | Power Consumption | As per IEC Standard or IS 16444 (Part 2) Meter with lowest power consumption shall be preferred. |
| 5.9 | Limits of error | As per IEC Standard or IS 14697 |
| 5.10 | Operating Temperature Range | As per IEC Standard or IS 14697 |
| 5.11 | Humidity | As per IEC Standard or IS 14697 |
| 5.12 | Insulation Level | As per IEC/IS standard |
| 5.13 | Influence of supply voltage | As per IEC Standard or IS 14697 |
| 5.14 | Short time over current | As per IEC Standard or IS 14697 |
| 5.15 | Immunity to phase and earth fault | As per IEC Standard or IS 14697 |
| 5.16 | Influence of Self Heating | As per IEC Standard or IS 14697 |
| 5.17 | Influence of Heating | As per IEC Standard or IS 14697 |
| 5.18 | Other Influence Quantities | As per IEC Standard or IS 14697 |
| 5.19 | Electromagnetic compatibility | a) Meter shall remain immune to electrostatic discharge, electromagnetic HF field and fast transient burst.<br>b) The meter shall be designed in such a way that conducted or radiated electromagnetic disturbances as well as electrostatic discharge do not influence the meter.<br>c) Meter shall be type tested for electromagnetic compatibility.<br>d) Meter shall comply requirement of IEC Standard. |

| | | |
|---|---|---|
| | | or IS 14697 |
| 5.20 | Limits of error due to influence quantities | Meter shall work within guaranteed accuracy as per IEC Standard or IS 14697 under and after influence of following:<br>a) Current Variation<br>b) Ambient Temperature Variation<br>c) Voltage Variation<br>d) Frequency Variation<br>e) 10% Third Harmonic in current<br>f) Reversed Phase Sequence<br>g) Voltage Unbalance<br>h) Harmonic components in current and voltage circuit<br>i) DC and even harmonics in AC current circuit<br>j) Odd harmonics in AC current circuit.<br>k) Sub harmonics in AC current circuit<br>l) Continuous (DC) "stray" magnetic induction.<br>m) Continuous (DC) "abnormal" magnetic induction.<br>n) Alternating (AC) "stray' magnetic induction<br>o) Alternating (AC) "abnormal' magnetic induction<br>p) External magnetic field<br>q) Electromagnetic HF fields<br>r) Radio frequency interference<br>s) DC immunity test<br>**Note:**<br>BPCL reserves the right to formulate any other test method to check magnetic immunity/ logging of meter. |

## 6. Meter Display

| Sl. No | Particulars | Description |
|---|---|---|
| 6.1 | LCD Type | STN Liquid crystal with backlit |
| 6.2 | Size of LCD | Minimum 10X5mm |

| | | |
|---|---|---|
| 6.3 | LCD Digits | Total 6+1 digits |
| 6.4 | LCD language | English |
| 6.5 | Display modes | a. Auto Mode<br>b. Manual Mode |
| 6.6 | Display indications | Appropriate indications/flags for all tampers and self-diagnostic features should be provided. |

## 7. Functional Requirement

| S.No | Particulars | Description |
|---|---|---|
| 7.1 | Meter category | DT Energy meter comply with IEC Standard or D3 category of IS 15959 (Part 3). |
| 7.2 | Mode of metering | It should be possible to configure meters in following modes of metering:<br>a) Forward: In this mode any export active energy shall be treated as import energy and shall be recorded in forward only register. Bidder shall provide detailed explanation (standards involved) on apparent energy calculation in this mode.<br>b) Bidirectional: Both Import and export energy recording shall be applicable in this mode of metering and relevant registers shall be updated. Any change in metering mode shall be logged in events with date and time stamp.<br><br>Default mode of metering shall be forward only. |
| 7.3 | MD calculation | Block window with default demand integration period of 15mins configurable from 1min to 60mins as per requirement and meter shall be configurable for block/sliding window for MD recording. |
| 7.4 | Instantaneous Parameters | All the parameters mentioned in IEC Standard or table '1' of IS 15959 (Part 3) along with following additional parameters shall be supported by meter:<br>a) Neutral Current (IN)<br>b) % THD in R, Y, B phase Voltage<br>c) % THD in R, Y, B phase Current |
| 7.5 | Billing data | a) Billing parameters shall be generated at the end of each billing cycle (monthly) and stored in memory as per IEC Standard or IS 15959(Part |

| | | |
|---|---|---|
| | | 3).<br>b) Minimum of 12 numbers of billing cycle parameters shall remain in meter memory along with current cycle parameters and shall be available for reading as well as profile and or 'by entry' for selective access.<br>c) All the parameters mentioned in IEC Standard or table '4' of IS 15959 (Part 3) shall be supported by the meter. |
| 7.5.1 | Selective access | Support for selective access shall be provided for billing parameters as per IEC Standard or clause no 11.3 of IS 15959 (part 1) |
| 7.5.2 | Billing period reset/ MD reset | 12:30hrs of 1st of every month |
| 7.5.3 | Billing period reset mechanism | As per IEC Standard or clause 10 of IS 15959 (Part 1) |
| 7.5.4 | Billing period counter | Cumulative billing period counter since installation and available billing periods shall be provided as per IEC Standard or clause 11.2 of IS 15959 (Part 1) |
| 7.6 | Load survey Data | a) Load survey parameters shall be measured and recorded at the end of each profile capture period for last 60 Power ON days.<br>b) All the parameters mentioned in IEC Standard or table-15 of IS 15959 (Part 3) along with following additional parameters shall be supported by meter:<br>% THD in R, Y, B phase Voltage<br>% THD in R, Y, B phase Current |
| 7.6.1 | Profile capture period | Default 15mins programmable from 1min to 60mins |
| 7.6.2 | Selective Access | Support for selective access shall be provided for billing parameters as per IEC Standard or clause no 11.3 of IS 15959 (part 1). |
| 7.7 | Daily load profile | Daily load profile parameters shall be measured and recorded at each midnight i.e. 00:00hrs for last 60 Power ON days. All the parameters mentioned in IEC Standard or table '3' of IS 15959 (Part 3) shall be supported by meter as Daily load profile parameters. |
| 7.8 | General Purpose Parameters | Following parameters shall be provided in Non Volatile memory (NVM) of the meter as per IEC Standard or |

| | | |
|---|---|---|
| | | clause 16 of IS 15959 (Part 3). |
| 7.8.1 | Name Plate Detail | As per IEC Standard or Table '12' of IS 15959 (Part 3) with additional parameter of Month of manufacturing. |
| 7.8.2 | Programmable parameters | These parameters shall be programmed remotely (BCS and locally by CMRI/Computer) via proper access rights. Every transaction shall be logged in non-volatile memory of the meter with date and time stamp. Programming of any of the parameters shall increment the 'cumulative programmable count' value. All the parameters mentioned in IEC Standard or table-13 of IS 15959 (Part 3) shall be supported by meters. |
| 7.9 | Push Services | a) DT meter is able to automatically notify data, event, and messages to a destination client system in an unsolicited manner (without a request from a client) as per IEC Standard or clause no 6 of IS 15959 (Part 2)<br>b) Randomization: Data from different endpoints shall be pushed intelligently on the network in order to avoid excessive traffic on the network.<br>c) It shall also be possible to configure push services for all profiles (instantaneous, billing, load survey, daily energy and events). Bidder shall explain its capability to configure push services. However following push services shall be available by default.<br>1. Load survey profile data at after every 4 hours configurable to any predefined interval.<br>2. Mid night data at 00:00hrs of every day.<br>3. Billing profile data on occurrence of billing. |
| 7.9.1 | Periodic push (Smart meter to BCS) | a) Meter shall be able to push instantaneous parameters, block data to BCS at predefined intervals. Parameters required for push shall be intimated during detailed engineering in the vent of order.<br>b) Other attributes as per IEC Standard or IS 15959 (Part 3) i.e. Send Destination, Communication window, Randomization time interval, number |

| | | |
|---|---|---|
| | | of retries and repeat delay shall be decided in the event of manufacturing. |
| 7.9.2 | Event Push (Smart meter to BCS) | a) Meter is able to report BCS, the status change of any of the identified events mapped in to event status word (ESW) of size 128 bits by pushing following objects to BCS.<br>1. Device ID<br>2. Push Setup ID<br>3. Real time clock- Date and Time<br>4. Event Status Word 1 (ESW 1).<br>b) Each of the bits in ESW shall reflect the current state of the event and are mapped against each of the identified events.<br>c) An event status word filter (ESWF) of 128 bit shall also be provided to configure events for event push. Events which are supported in meter shall only be configured for event push. Bit value 1 in ESWF shall indicate that the event is supported and value 0 indicates that event is not supported for event push. Position of the event bit in ESWF shall be same as in ESW. |
| 7.9.3 | Event status Bit mapping | As per IEC Standard or IS-15959(Part 3) |
| 7.10 | Firmware upgrade | a) Smart meter shall support remote firmware upgrade feature for meter firmware without loss of any data and metrology for a part or complete firmware of meter.<br>b) Firmware upgrade shall use the image transfer classes and mechanisms specified in IEC62056-6-2 and IEC62056-5-3.<br>c) Firmware upgrade feature shall be provided with proper security. The design shall take into account field scenarios such as power failure during F/W upgrade.<br>d) Once the firmware is upgraded, meter shall send an acknowledgment BCS. It shall also log it as an event in its memory.<br>e) Meter shall support capability to self-register the meter with new firmware.<br>f) The execution time of the change of the |

| | | |
|---|---|---|
| | | firmware within the meter should be below 5 minutes. |
| 7.11 | Support for broadcast message | Meter shall support connection less messaging services of DLMS to support broadcast messages for a group of meters for following actions:<br>a) Gap reconciliations.<br>b) Firmware upgrade.<br>c) On demand readings<br>d) Meter connection and disconnection.<br>e) Updating of Programmable parameters |
| 7.12 | Security | Advanced security as per IEC Standard or clause 7.1.2 of IS 15959 (Part 1). |
| 7.12.1 | Encryption for data communication | As per IEC Standard or clause 7.1 of IS 15959 (Part 2) |
| 7.12.2 | Encryption/ Authentication for data transport | As per IEC Standard or clause 7.2 of IS 15959 (Part 2) |
| 7.12.3 | Key requirement and handling | As per IEC Standard or clause 7.3 of IS 15959 (Part 2) |
| 7.13 | IP communication profile support | Meter shall support TCP-UDP/ IP communication profile for smart meter to BCS. |
| 7.14 | Event and tamper detection | Meter shall detect and log any exceptional/ fraud/ tamper conditions in its memory as an event. In addition to this all transactions and control shall also be recorded as an event in meter memory. Each event type shall be identified by an event ID. |

| | | |
|---|---|---|
| 7.14.1 | Compartments of events | Meter shall be able to log events in following compartments:<br>a) Voltage Related Events<br>b) Current Related Events<br>c) Power Related Events<br>d) Others Events<br>e) Non Roll Over Events<br>f) Transaction related events<br>g) Control Events |
| 7.14.2 | Parameter Snapshot | Meter shall capture all the parameters mentioned in IEC Standard or table '24' of IS 15959 (part 3) when event occurrence and restoration is logged |
| 7.14.3 | Event Logging | The meter shall log minimum 100 tamper events (ensuring at least 20 events for each tamper). |
| 7.14.4 | Tamper Indication | Appropriate Indications/Icons for all tampers should appear on the meter display either continuously or in auto display mode. |
| 7.15 | Phasor Representation | Meter shall support parameters required to develop phasors of current and voltage at BCS. |

**Note:**
The meter data API (*RESTful API*) shall be provided along with the meter supply.

## 8. Tamper and Fraud Detection Requirements

### 8.1 Current Related

a) Occurrence and restoration of following current related events shall be logged in meter memory as per IEC Standard or table A5 of IS 15959 (Part 2). Threshold value should be customizable/programmable.

i. **Current Reverse (R-phase, Y-phase and B-phase)**
Meter should log the event of reversal of C.C polarity. Meter should register energy consumed correctly with any one, two or all three current coils reversed. This event shall not be valid in bidirectional mode of metering.

ii. **Current Open (R-phase, Y-phase and B-phase)**
Meter should log the event of current coil open. Threshold value of current should be programmable at factory end.

iii. **Current Bypass**
Meter should log the event of current coil shorting/bypass. Threshold value of current should be programmable at factory end.

iv. **Over Current**
If the current in any phase exceeds the specified threshold current, meter should log over current event.

b) For each occurrence event captured, the cumulative tamper count shall be incremented.
c) Selective access shall be provided as per IEC Standard or clause 11.3 of IS 15959 (Part 1).

**8.2 Voltage related**

a) Occurrence and restoration of following Voltage related events shall be logged in meter memory. Threshold value should be customizable/programmable.

i. **Voltage Missing**
Absence of potential on any phase should be logged. Restoration of normal supply shall also be recorded.

ii. **Over Voltage**
Meter should log high voltage event if voltage in any phase is above a threshold value.

iii. **Low voltage**
Meter should log low voltage event if voltage in any phase is below a threshold value.

iv. **Voltage Unbalance**
Meter should log voltage imbalance event when the difference between minimum and maximum phase voltage is more than a threshold value.

v. **Voltage Harmonics**
Meter should log occurrence of high voltage harmonic event when % THD in voltage of phase will be more than threshold value.

b) For each occurrence event captured, the cumulative tamper count shall be incremented.

**8.3 Power Related**

a) Occurrence and restoration of following Power related events should be logged in meter memory as per IEC Standard or table A6 of IS 15959 (Part 2).

i. **Power On/Off**
The meter shall detect power off if both the auxiliary supplies fail. The event shall be recorded on the next power up. At the same time power on event shall be recorded. No snapshot shall be logged with this event.

b) Only Real clock (date and time) and event code shall be captured.
c) Selective access shall be provided as per IEC Standard or clause 11.3 of IS 15959 (Part 1).

**8.4 Other Events**

a) Occurrence and restoration of following events shall be logged in meter memory as per IEC Standard or table A8 of IS 15959 (Part 2).

i. **Abnormal External Magnetic Influence**
Meter should either be immune or should log the events of attempt of tampering by external magnetic field as per relevant IEC Standard or IS 14697 with latest amendments.

ii. **Neutral Disturbance**
Meter shall log all events when AC/DC/ Pulsating voltage is injected in neutral circuit especially when it can disturb the recording of energy. Manufacturer should specify the method of testing of Neutral disturbance.

iii. **HV Spark**
Meter with communication card should be immune or log the event in the case of application of ESD up to and including 35 KV.

b) In addition, the following events shall be logged also be logged in meter:

i. **Lower Power Factor**
Meter shall able to detect and log the low PF event if power factor of the load found in between 0.2 to 0.5 for a load above than a % threshold value for a threshold time value.

ii. **Configuration Change**
Meter should log the change in metering mode configuration and the change in payment mode configuration.

iii. **High Neutral Current**
Meter should log event of high neutral current if measured neutral current should be more than predefined threshold value.

iv. **Distorted PF**
Meter shall log the event if difference between displacement PF and actual PF is more than a predefined value.

v. **Time Based Event Stamp**
Meter shall log voltage, current, PF and energy consumption on a predefined time.

c) For each occurrence event captured, the cumulative tamper count shall be incremented.
d) Selective access shall be provided as per IEC Standard or clause 11.3 of IS 15959 (Part 1).

**8.5 Non Rollover events**

Occurrence of following non-rollover events shall be logged in meter memory as per IEC Standard or table 'A9' of IS 15959 (Part 2).

i. **Top Cover Open**
Meter shall detect opening of top cover and this event shall be logged. Detection and logging mechanism shall work even when the meter is de-energized.

a) For each occurrence event captured, the cumulative tamper count shall be incremented.
b) For this event, only date and time shall be captured.
c) Selective access shall be provided as per IEC Standard or clause 11.3 of IS 15959 (Part 1).

**8.6 Tamper Logics**

A logic sheet for tamper/event detection and logging shall be submitted for BPCL's approval. Following details should be provided for each tamper in tabular form:
a) Detailed Tamper logic
b) Threshold values
c) Persistence times
d) Restoration time
e) Event count

**Note:**
1) Event ID's shall be defined as per IEC Standard or IS 15959 (part 2). Approval shall be taken from BPC prior to manufacturing for Event ID's.
2) Programming of threshold values should be possible from remote via proper authentications. Logics of tampers shall be configurable via firmware up gradation from remote.



3) All the programming changes/ firmware up gradations shall be logged along with date and time stamp in meter as well as on BCS.

**9. Construction Feature**

| S.No | Particulars | Description |
|---|---|---|
| 9.1 | Base Body | Material - Opaque and UV stabilized polycarbonate of grade LEXAN 143/ 943 or Equivalent with V-0 inflammability level. |
| 9.2 | Top Cover | a) Material: Transparent/Opaque and UV stabilized polycarbonate of grade LEXAN 143/ 943 or Equivalent with V-0 inflammability level.<br>b) Top cover and base should be Ultrasonically/Chemically welded. |
| 9.3 | Terminal Block | a) Material - Flame retardant glass filled polycarbonate of grade 500 R or equivalent.<br>b) Terminal block shall be capable of passing the tests as per ISO - 75 for a temperature of 135C and pressure of 1.8MPa. The terminals shall be designed so as to ensure adequate and durable contact such that there is no risk of loosening or undue heating. |
| 9.4 | Terminal cover | a) Material - UV stabilized transparent/Opaque polycarbonate cover.<br>b) Provision of sealing at two points through sealing screw.<br>c) The sealing screws shall be held captive in the terminal cover.<br>d) The terminal cover shall be extended type with baffle wall above the cable entry base wall so that access to the terminals is not possible (even with thin metallic wire) without breaking the seal. Terminal cover should have provision for cable entry from bottom.<br>e) Diagram of external connections should be embossed on terminal cover.<br>f) Mechanism shall be provided to record an event with occurrence and restoration in case of meter enclosure/terminal cover is opened. |

| | | |
|---|---|---|
| 9.5 | Terminals | a) Material of terminals, screws and washers should be brass or tinned copper. Terminals shall be tested for continuous current of 150 % $I_{max}$.<br>b) Terminals shall be clearly marked for phase / neutral/outgoing etc.<br>c) Clearances and Creepage shall be as per IEC Standard or IS 14697. |
| 9.6 | Meter Enclosure | Polycarbonate meter enclosure (with all the accessories for pole mount) shall be provided with meter as per Protection Class IP-65 or better. |
| 9.7 | Ingress Protection | IP 54 or better |
| 9.8 | Output device | Meter should have flashing LED visible from the front to represent energy recording. |
| 9.9 | RTC | a) The meter shall have internal real time crystal clock to set date and time.<br>b) Drift in time of this clock shall not be more than ±5 minutes/ year at a reference temperature of 27°C.<br>c) Meter RTC shall be corrected automatically by the system in synchronization to the network RTC.<br>d) BCS shall have the feature to sync RTC. |
| 9.10 | Battery | Lithium ion battery with guaranteed shelf life of 10 years and capacity life of 15 years. Lithium Thionyl Chloride battery will be preferred. Working & memory of the meter shall not be affected in case of battery removal/total discharge. |
| 9.11 | Memory | Non-volatile memory independent of battery backup memory shall be retained for at least 5 years without any auxiliary power. |
| 9.12 | Self-Diagnostic feature | Meter shall have self-diagnostic for the following:<br>a) Date and RTC.<br>b) Battery.<br>c) Non-volatile memory.<br>d) Display.<br>e) Status of Communication card. |

| | | |
|---|---|---|
| 9.13 | Optical port | Meter shall have an optical port with a metal ring to hold magnet of probe. Optical port shall comply with hardware specifications provided in IEC-62056-21. |
| 9.14 | Communication Module Interface port | a) Meter shall have the provision for at least 1 no's plug in communication module for future connectivity. The same interface shall be compatible with both Cellular and RF communication technologies interchangeably according to the future requirement.<br>b) Meters shall have at least one RS232/RS485/Ethernet port.<br>c) Meter shall have mechanism to log communication module removal as an event in its memory with date and time stamp. |
| 9.15 | Last Gasp | Meter shall have provisions to provide last gasp signals through communication module in case of power failure. |
| 9.16 | Meter Sealing Arrangement | Sealing should be in accordance with IEC Standard or IS metering regulations with latest amendments. |
| 9.16.1 | Manufacturer's Seals | a) One polycarbonate seal to be provided on meter-cover.<br>b) At least one seal as Hologram type, numbered with hologram transfer on tamper proof paper seal. |
| 9.16.2 | BPCL Seals | a) At least one seal as hologram type, numbered with hologram transfer on tamper proof paper seal.<br>b) At least one Polycarbonate seal should be provided on top cover. |
| 9.17 | Name Plate and marking | Meter should have clearly visible, indelible and distinctly marked name plate in accordance with IEC Standard or IS 16444 (Part 2) & clause no.13 of this specification. |
| 9.18 | Resistance against heat and fire | The terminal block and meter case shall have safety against the spread of fire. They shall not be ignited by thermal overload of live parts in contact with them as per IEC Standard or IS 14697. |

**10. Data and Communication Requirements (Protocol / Software)**

| Sl. No | Particulars | Description |
|---|---|---|
| 10.1 | NIC (RF Mesh / GSM/GPRS) | Meter shall have provision for pluggable and interchangeable NIC (RF/GSM/GPRS/2G/3G/4G/LTE). Based on field requirement NIC of above mentioned type can be used without changing the meter. |
| 10.2 | Data Exchange protocol | As per IEC Standard or IS 15959 (Part 2). The data exchange shall be as per DLMS standards/ IEC DLMS protocols suite (62056). |
| 10.3 | Base Computer Software | Minimum 30 licensed software with the following features should be supplied. |
| 10.3.1 | Operating System | BCS should be compatible for latest Windows operating system or latest Linux System (preferably Ubuntu). |
| 10.3.2 | Security | System shall be password protected where user can login only if login ID is provided by administrator. BCS shall have rights management system so that access rights can be provided as per requirement to maintain security. |
| 10.3.3 | Database | BCS shall maintain master database according to desired area, location, and region etc. |
| 10.3.4 | Reporting | a) BCS shall have option of user defined report generation in format of Excel, Word and CSV, XML, PDF etc.<br>b) BCS shall have capability to export data in ASCII, CSV and XML format at desired location so that the same could be integrated with our billing data for processing.<br>c) All the data available in the meter shall be convertible to user defined ASCII, CSV and XML file format.<br>d) BCS shall have capability to read, interpret and display instantaneous, load survey, billing, transaction and events/tampers parameters/data mentioned in this specification directly from meter and through CMRI/Computer |
| 10.3.5 | Data transfer rate | BCS and communication ports should support data transfer rate of 9600 bps (minimum). |
| 10.4 | Software for local communication (HHU/Computer ) | a) The manufacturer has to provide software capable of downloading all the data stored in meter memory through Window/Linux/Android operating system based handheld units (HHU)/Computer through optical port.<br>b) HHU/Computer software should have option for selection of Parameters to be downloaded from |

| | | |
|---|---|---|
| | | meter.<br>c) Meter data consisting of all parameters and complete load survey for all parameters shall be read by HHU/Computer and downloaded on BCS in minimum possible time (not more than 5 minutes). |
| 10.5 | Mobile Workstation | The mobile workstation/commercial laptop shall be from reputed brands (Dell Latitude Series, Apple, HP) with minimum following configurations:<br>1. Processor: 11th Generation Intel® Core™ i7-1185G7 (4 Core, 12M cache, base 3.0GHz, up to 4.8GHz, vPro)<br>2. Operating System: Windows 10 Pro 64bit English<br>3. Display: 15.0" UHD16:9(3840 x 2160)Non-T, AG, IR Cam + P-Sensor, Shutter, Mic, SLP,Cmft View+(500 Nits)<br>4. Memory: 32GB, 4267MHz, LPDDR4x, Non-ECC<br>5. Hard Drive: M.2 1TB PCIe NVMe Class 35 Solid State Drive |
| 10.6 | Training | Manufacture shall provide free training (with in-depth user manual) to BPCL officials for usage of software and meter. |

**11. Tests**

**11.1 Type Tests & Test Certificates**

Smart meter shall be type tested for all the type tests as per IEC Standard or IS 14697 / IS 16444 (Part 2).

Bidder shall submit, along with tender, all Type Test Certificates as per IEC Standard or IS-14697. Certificates shall be issued from national approved laboratory and other international bodies only. These test certificates shall pertain to Single Phase Two Wire and Three Phase Four Wire Static, CT Operated -/5A, only. Further, these test certificates must not have been issued earlier than five years from the original scheduled date of bid opening. Bidders shall also submit, along with tender, Test Certificates of high quality **Reinforced Polycarbonate** or equivalent High Grade Engineering Plastic material used for meter housing material i.e. base/cover/terminal cover from any Govt. approved Laboratory.

### 11.2 Routine & Acceptance Tests

The Routine tests shall be carried out as per IEC Standard or IS-14697. Apart from above test meter shall be also be tested for all functional requirement through communication as part of acceptance test.

### 11.3 Abnormal Voltage/ Frequency Device Test

The accuracy of the meter shall not be affected with the application of abnormal voltage/ frequency generating device available in standard international laboratory having spark discharge of approximately 35KV. The meter shall be tested by feeding the output of this device to the meter in any of the following manners for a total period of 10 minutes:

- On phase or neutral terminals
- On any connecting wires of the meter
- Spark on meter body (including optical port)
- At any place in load circuit

Accuracy of the meter shall be checked before and after the application of the above device. During this test i.e. during the application of abnormal voltage/frequency generating device, display as well as pulse of meters should not be affected.
Supplier shall submit all test procedures for BPC's review. Only upon receiving BPC's endorsement of the procedures, tests shall be conducted.

## 12. Inspection

- The martials shall be subjected to all its routine inspections and tests as per relevant IS or IEC specifications. The supplier shall give the purchaser two weeks written notice of the materials being ready for testing. Unless the test is waived off, the purchaser shall attain such test on the scheduled date for which purchaser has been so notified or on a mutually agreed alternative date.
- The inspecting officer of the purchaser will inspect the meter as per sampling plan for acceptance test as per IEC Standard or IS 14697, apart from above test meter shall be also be tested for all functional requirement through communication as part of acceptance test. After testing, these sample meters shall be additionally sealed by the inspecting officer and one copy of the inspection report will be handed over to the manufacturer.
- The supplier or manufacturer shall propose appropriate solution to facilitate the inspection in events of natural and unavoidable global catastrophe

## 13. Name Plate and Marking

Meter shall bear a name plate clearly visible, effectively secured against removal and indelibly and distinctly marked in-accordance with IEC-1036/IS-14697. In addition, the words "Property of BPCL" along with the Purchase Order No. and year/month of manufacture shall either be punched or marked indelibly on the name plate. Purpose of LED indicators shall be clearly printed on the name plate.

| Sl. No | Description |
|---|---|
| 13.1 | Meter Serial number shall be of 8 digits. Serial number shall be printed in black colour. |
| 13.2 | Bar code shall be printed along with serial number |
| 13.3 | 'BPCL' insignia shall be printed |
| 13.4 | BPCL PO No. & date |
| 13.5 | Manufacturers name and country of origin |
| 13.6 | Model type |
| 13.7 | Month and Year of manufacturing |
| 13.8 | Reference voltage / current rating |
| 13.9 | The number of phases and the number of wires for which the meter is suitable. Graphical symbol as per IEC Standard or IS 12032 can be used. |
| 13.10 | Meter constant |
| 13.11 | Class index of meter |
| 13.12 | Reference frequency |
| 13.13 | Warranty period |
| 13.14 | Name plate for meter box<br>a) Name of purchaser with company logo<br>b) Project name<br>c) Installation year |

## 14. Packing & Transportation

The meters shall be suitably packed for vertical/horizontal support to withstand handling during transport. The bidder shall be responsible for any damage during transit due to inadequate or improper packing. The meter shall be packed appropriately to ensure safe transportation, handling, identification and storage. All packing materials shall be environment law in force.
The primary packing shall ensure protection against humidity, dust, grease and safeguard the meters performance until its installation. The secondary packing shall provide protection during transport. The packing case shall indicate "Fragile in nature" and direction of placement of box. Each packing shall indicate marking details like meters, quantity etc.

### 15. Delivery

Bidder shall despatch the material, only after the successful completion of Routine Tests of the material witnessed by the Purchaser, and after receiving written Material Despatch Clearance (MDC) from the Purchaser.

Commitment of delivery in LOT (detail to be discussed in pre-award meeting) and delivery commencement date shall be mentioned in contract execution schedule with tentative date of arrival of first batch at BPC, RSD, Phuentsholing, Bhutan.

### 16. Training

The bidder / manufacturer shall arrange training programmes for administration training, user training and diagnostics-troubleshooting training at no extra cost to BPC. The trainees shall be provided with training documents (system software manual, system operation manual). Training shall be imparted to at least 20 officers for user training and at least 5 officers for administrative training.

Training shall be conducted for at least 5 working days each and before any mentioned tests or inspections to be performed under this technical specifications.

**Note:** In addition to training on software and meter, the training shall also include demonstration on at least one of the pluggable and interchangeable (cellular technology will be recommended) as per clause 10.1 of this specification with detailed remote communication and all relevant data configurations between BCS and meters. In addition, pole mount installation of meter enclosure/box using clamps as per the Annexure 'B' and related accessories shall also be arranged in advance and demonstrated in detail.

### 17. Documents and Drawings Submission

Documents and Drawings submission shall be as per the table given below. All documents/ drawing shall be provided on A4 sheet in box file with separators for each section. Language of the documents shall be English only. Deficient/ improper document/ drawing submission may liable for rejection.

Every meter shall have a diagram showing the external connection appropriate to its type securely attached inside of the terminal cover. The sequence of connections shall conform to IEC Standard or IS: 14697 and terminal arrangement shall have sequence R(in), R(out), Y(in), Y(out), B(in), B(out) and Neutral (in), Neutral (out). Schematic diagram of meter shall also be supplied with tender. All the bidders shall submit proposed meter box layout (including all pole mount clamping accessories details) and diagrams. The submittals shall include single phase meters, three phase meters, meter enclosure/box, current transformers and any other related accessories.

| Sl. No | Particulars | BID | Approval | Pre-Dispatch |
|---|---|---|---|---|
| 1 | All Guaranteed Technical Particulars (GTP) | Required | | |
| 2 | Deviation Sheet, if any | Required | | |
| 3 | Tamper Sheet | Required | | |
| 4 | Display Parameters | Required | | |
| 5 | Cross sectional drawing of Meter showing all the views / sections | Required | Required | |
| 6 | List of software and accessories required for installation/ operation of meter | Required | | |
| 7 | Manufacturer's quality assurance plan and certification for quality standards | Required | | |
| 8 | Type Test reports of offered model/type/rating | Required | | |
| 9 | All relevant standard certificates | Required | | |
| 10 | Complete product catalogue and user manual. | | | Required |
| 11 | Performance Certificate | Required | | |
| 12 | General Arrangement Drawings | | Required | Required |
| 13 | Operation and maintenance Instruction as well as trouble shooting charts/ manuals | | Required | Required |
| 14 | Inspection and test reports of whole assembled set of equipment | | | Required |
| 15 | Routine Test certificates | | | Required |
| 16 | Meter Seal data | | | Required |
| 17 | CT rating details against each transformer rating given in ***annexure 'A'*** | Required | | |

**18. Bill of Quantity**

| Sl. No. | Item Description | Unit | Quantity |
|---|---|---|---|
| A | DT Smart Grid Ready Meter Supply and Delivery | | |
| 1 | Single phase static transformer connected DT Meter 240V, -/5 of accuracy class 1 with associated accessories for successful pole mount installation as per the specifications. | Nos. | 962 |

| | | | |
|---|---|---|---|
| 2 | Three phase static transformer connected DT Meter 415V, -/5 of accuracy class 0.5S with associated accessories for successful pole mount installation as per the specifications. | Nos. | 3918 |
| B | **Meter Box Supply and Delivery** | | |
| 1 | DT meter box for Single Phase as per the specifications mentioned including all the accessories for pole mount. | Nos. | 962 |
| 2 | DT meter box for Three Phase as per the specifications mentioned including all the accessories for pole mount. | Nos. | 3918 |
| C | **Current Transformers Supply and Delivery** | | |
| 1 | Current transformers for Single Phase meters as per the specifications | LOT | 1 |
| 2 | Current transformers for Three Phase meters as per the specifications | LOT | 1 |
| D | **Software, Probe, Mobile workstation and Control Cables Supply and Delivery** | | |
| 1 | Basic Computer Software as per the specifications | Nos. | 30 |
| 2 | Software for local communication (HHU/CMRI/Computer) | Nos. | 30 |
| 3 | Meter data API (*RESTful API*) | LOT | 1 |
| 4 | Optical Probes for local communication as per the specifications | Nos. | 30 |
| 5 | Mobile Workstation as per the specifications | Nos. | 1 |
| 6 | A 5 core (2.5 sq.mm, as per relevant IEC Standard or IS) HRFR PVC insulated flexible multi strand control cables as per the specifications. | M | 15000 |
| 7 | A 7 core armoured (2.5 sq.mm, as per relevant IEC Standard or IS) HRFR PVC insulated flexible multi strand control cables as per the specifications. | M | 12000 |

## 19 Technical Specification of Current Transformer

### 19.1 Scope

This specification covers design, supply and delivery of suitable Resin cast Ring Type LT Current transformer (CT), of accuracy class 0.5 for all the Distribution Transformer (DT) Energy Meters supplied in this project. Current Transformers shall be outdoor type and suitable to be mounted on the bushing/ cable of LT side of transformer. Suitable fixing arrangement to mount the CT on the transformer's LT cable shall be provided with each Current Transformer. The ratings of DTs are given in the ANNEXURE 'A'. The contractor may refer the same for

appropriate design of CTs required for the DT meters. All the CT rating against the DT rating provided shall be submitted during the BID and Approval period.

### 19.2 Applicable Standards

CT ring shall comply with the IEC Standard or IS: 2705/1992 (Part- I & II) and the latest version thereof.

### 19.3 General Technical Specification Of Resin Cast Ring Type L.T. Current Transformers

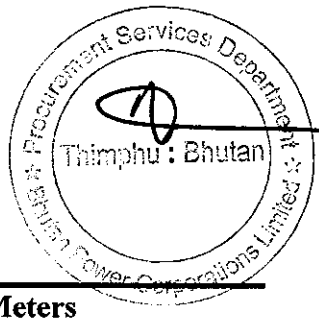
a) The Current transformer shall have suitable internal diameter to accommodate a primary conductor that may be cable / bus-bar / Secondary terminal of Distribution transformer. The current transformers shall have rated burden as 5 VA.
b) Current transformers shall be of Resin cast type, suitable for outdoor installation, insulation class of insulation shall be "F" as specified in IEC Standard or IS 2705. Details of material used for the construction of CTs shall be provided with the bid.
c) The polarity marking on the offered CT primary & secondary side should be embossed.
d) A 5 core and 7 core (2.5 sq.mm, as per relevant IEC Standard or IS) HRFR PVC insulated flexible multi strand copper cable (armoured) shall be provided for the connection of CT and DT Energy Meters terminals.
e) Ferrules, lugs, cable ties and all other relevant accessories shall be provided by the contractor.
f) Metallic clamp should be provide to hold the current transformer with any of the mentioned primary conductor in **clause 19.1**.

### 19.4 Tests

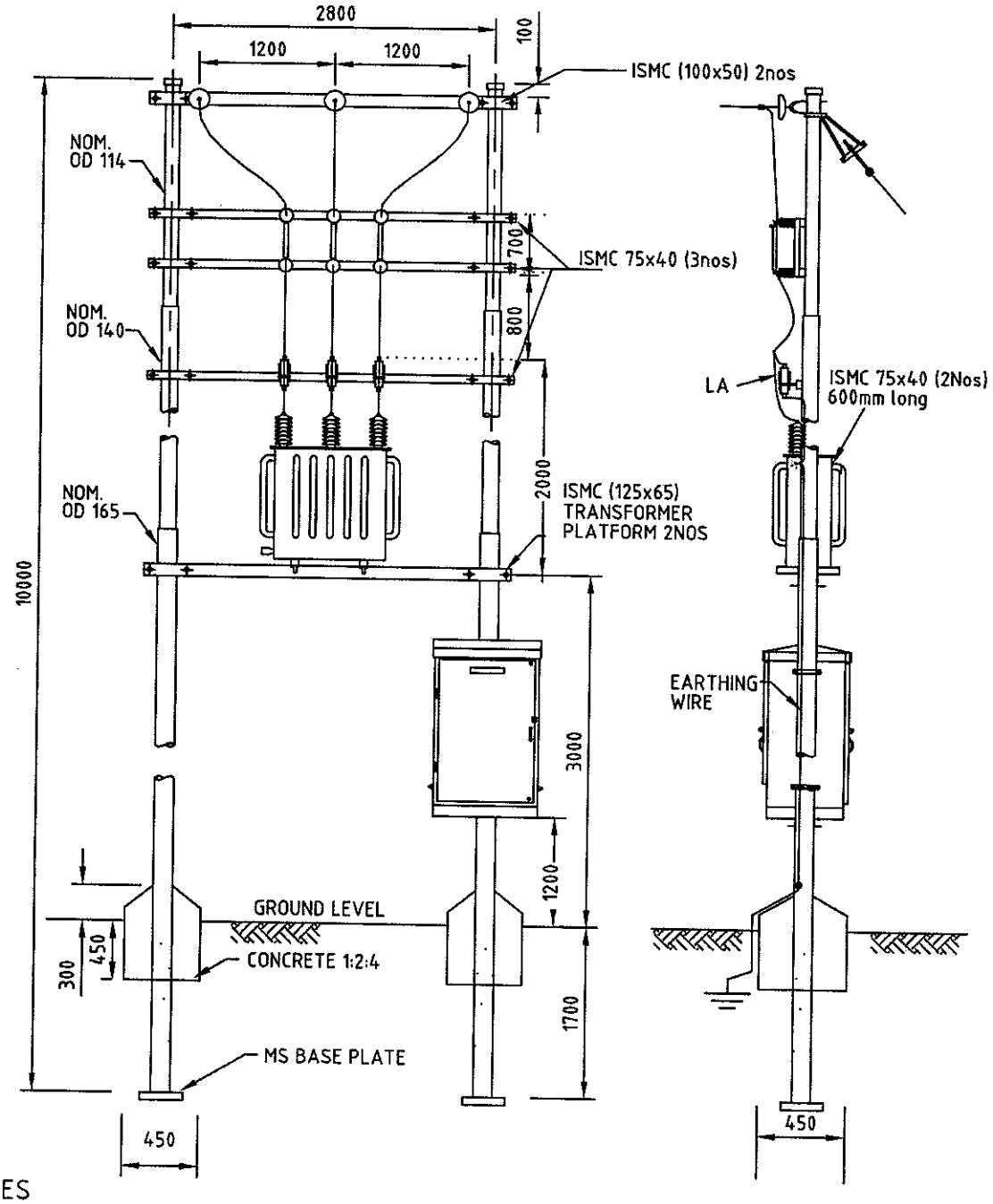
a) Current Transformer shall comply with and shall be subjected to all routine tests prescribed in relevant IEC Standard or IS: 2705/1992.
b) Acceptance & Routine Tests: All routine tests as stipulated in the relevant standards shall be carried out and routine tests certificates shall be submitted before inspection.
c) Current transformer shall be type tested for the following tests as per IEC Standard or IS: 2705 or from reputed and Govt. approved Laboratory. Type test reports shall be not earlier than Seven years from the date of bid opening.

**Annexure A: Distribution Transformer Details**

| Rating (KVA) | Single Phase | Three Phase | Total |
|---|---|---|---|
| 10 | 170 | 32 | 202 |
| 16 | 383 | 203 | 586 |
| 20 | 0 | 4 | 4 |
| 25 | 362 | 1393 | 1755 |
| 30 | 2 | 108 | 110 |
| 40 | 0 | 1 | 1 |
| 50 | 0 | 32 | 32 |
| 63 | 3 | 1126 | 1129 |
| 75 | 0 | 6 | 6 |
| 100 | 0 | 80 | 80 |
| 125 | 3 | 246 | 249 |
| 150 | 0 | 7 | 7 |
| 160 | 0 | 51 | 51 |
| 163 | 0 | 2 | 2 |
| 200 | 0 | 8 | 8 |
| 240 | 0 | 1 | 1 |
| 250 | 9 | 237 | 246 |
| 300 | 0 | 1 | 1 |
| 315 | 15 | 65 | 80 |
| 350 | 0 | 1 | 1 |
| 400 | 9 | 9 | 18 |
| 500 | 5 | 162 | 167 |
| 630 | 0 | 27 | 27 |
| 750 | 0 | 38 | 38 |
| 800 | 0 | 7 | 7 |
| 850 | 0 | 2 | 2 |
| 1000 | 1 | 19 | 20 |
| 1250 | 0 | 5 | 5 |
| 1500 | 0 | 12 | 12 |
| 1600 | 0 | 7 | 7 |
| 2000 | 0 | 3 | 3 |
| 2500 | 0 | 12 | 12 |
| 3000 | 0 | 1 | 1 |
| 3100 | 0 | 1 | 1 |
| 5000 | 0 | 7 | 7 |
| 5300 | 0 | 1 | 1 |
| 6300 | 0 | 1 | 1 |



## Annexure B: DT Pole Details




NOTES

1. DIMENSIONS AS SHOWN ARE IN mm.

## Guaranteed Technical Particulars for DT Meters

**Lot 9 (Item A)-DT Meters**

| S.No | Description | Units | Bidders to Fill up | |
|---|---|---|---|---|
| | | | Single Phase Meter | Three Phase Meter |
| 1 | Type of meter | | | |
| 2 | Make & Model | | | |
| 3 | Name/Address of manufacturer | | | |
| 4 | Country of origin | | | |
| 5 | Standard/s to which meter conforms | | | |
| 6 | Firmware Version for the meter | | | |
| 7 | Remote configuration Software | | | |
| 8 | Accuracy Class of the meter | | | |
| 9 | Current | | | |
| 9.1 | Basic current (Ib) | | | |
| 9.2 | Starting Current | | | |
| 9.3 | Short time over current | | | |
| 9.4 | Current overloading capacity | | | |
| 9.5 | Maximum current (Imax) continuously with accuracy | | | |
| 10 | Rated Voltage | | | |
| 11 | Operating voltage range | | | |
| 12 | Rated Frequency | | | |
| 13 | Temperature Range (Operating ) | | | |
| 14 | Humidity | | | |
| 15 | Altitude | | | |
| 16 | Max. Power Consumption and Burden:<br>a) Voltage Circuit<br>b) Current Circuit | | | |
| 17 | Insulation resistance<br>a) Between frame &Current, voltage circuits connected together.<br>b) Between each current and voltage circuit & each and every other circuit. | | | |
| 18 | Compliance to Mechanical requirement as per IEC Standard or IS 16444 / IS 13779 | | | |
| 19 | Resistance to heat and fire (As per specification) | | | |
| 20 | Degree of protection (IP) | | | |
| 21 | Resistance against climatic influence (as per IEC Standard or IS 15884) | | | |
| 22 | Accuracy requirements as per IEC Standard or IS 16444 / IS 13779 | | | |
| 23 | Power factor range | | | |
| 24 | RTC as per IEC Standard or IS 15884 | | | |
| 25 | Non-volatile memory as per specification | | | |
| 26 | Self-diagnostic features as per specification | | | |
| 27 | Comply with communication requirements as per IEC Standard or IS 15959 and DLMS / COSEM protocol? | | | |
| 28 | Communication interface available | | | |
| 28.1 | Local | | | |
| 28.1 | Remote | | | |

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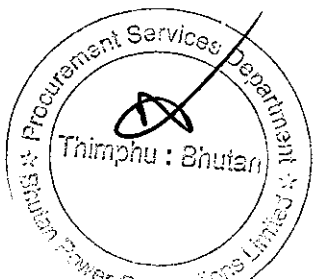
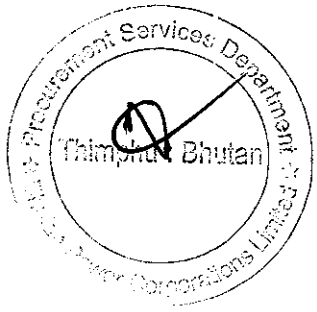
| S.No | Description | Units | Bidders to Fill up | |
|---|---|---|---|---|
| | | | Single Phase Meter | Three Phase Meter |
| 29 | Software features as per specification | | | |
| 30 | Display | | | |
| 30.1 | Type of display i.e. LCD | | | |
| 30.2 | Character size of display digits | | | |
| 30.3 | No. of display digits for data | | | |
| 30.4 | No. of display digits for parameter identification | | | |
| 30.5 | Life of display unit (guaranteed) | | | |
| 30.6 | Method adopted for display overflow | | | |
| 30.7 | Indication of healthiness of potential & current | | | |
| 30.8 | Provision of load switch control connection /disconnection status | | | |
| 30.9 | Earth Load Indication | | | |
| 30.1 | Meter cover open tamper event | | | |
| 31 | Display parameters in auto scrolling mode | | | |
| 31.1 | LCD Check | | | |
| 31.2 | Real time clock - Date and Time | | | |
| 31.3 | Cumulative Energy - KWH (I&E) | | | |
| 31.4 | Cumulative KVAH (I&E) | | | |
| 31.5 | KW MD (I&E) | | | |
| 31.6 | Average monthly signed power factor (I&E) | | | |
| 31.7 | Tamper count | | | |
| 32 | Programmable Parameters | | | |
| 32.1 | Real Time Clock -Date and Time | | | |
| 32.2 | Demand Integration Period | | | |
| 32.3 | Profile Capture Period | | | |
| 32.4 | Single –action Schedule for Billing Dates | | | |
| 32.5 | Activity Calendar for Time Zones etc., | | | |
| 32.6 | Time Zones script table | | | |
| 33 | Load Survey Parameters for last 60 days | | | |
| 33.1 | Real Time Clock - Date & Time | | | |
| 33.2 | Voltage | | | |
| 33.3 | Current | | | |
| 33.4 | Energy - KWH, KVAH (I&E) | | | |
| 33.5 | Demand - KW MD | | | |
| 33.6 | System Power Factor - PF | | | |
| 33.7 | Net Energy - KWh | | | |
| 33.8 | Net Demand - KW MD | | | |
| 34 | Overall dimensions, weight & drawing | | | |
| 35 | Reference standards | | | |
| 36 | Non-volatile memory retention time in absence of power | | | |
| 37 | Type / grade of material for | | | |
| | a) Meter base | | | |
| | b) Meter cover | | | |
| | c) Terminal block | | | |
| | d) Terminal cover | | | |
| 38 | Terminal block | | | |
| 39 | Meter earthing | | | |
| 40 | Sealing arrangement provided | | | |
| 40.1 | Meter body | | | |
| 40.2 | Meter Terminal block | | | |
| 40.3 | Communication Port | | | |

| S.No | Description | Units | Bidders to Fill up | |
|---|---|---|---|---|
| | | | Single Phase Meter | Three Phase Meter |
| 41 | Degree of protection against dust, moisture etc., | | | |
| 42 | Details of battery indication | | | |
| 42.1 | Guaranteed life of battery | | | |
| 42.2 | Low battery indication | | | |
| 42.3 | Internal battery | | | |
| 43 | ISO 9000 QA/QM certifications | | | |
| 44 | Other product certifications | | | |
| 45 | Calibration certificates | | | |
| 46 | User guide manuals / brochures | | | |
| 47 | General technical requirements as per clause # 5 | | | |
| 48 | Meter display as per clause # 6 | | | |
| 49 | Functional requirements as per clause # 7 | | | |
| 50 | Tamper and Fraud Protection as per clause # 8 | | | |
| 51 | Constructional requirements as per clause # 9 | | | |
| 52 | Data and Communication requirements as per clause # 10 | | | |
| 53 | Test Certificates as per clause # 11 | | | |
| 54 | Bid submittals as per clause # 18 | | | |
| 55 | Warranty Period offered | | | |

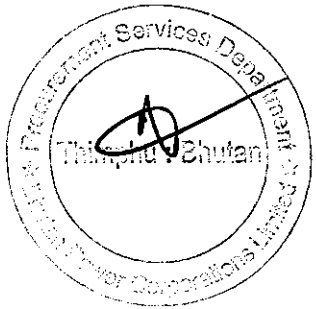


**Guaranteed Technical Particulars for Meter Enclosure Box**
**Lot 9 (Item B)-Meter Box**

| Sl. No. | Parameters | Bidders to Fill up |
|---|---|---|
| 1 | Manufacturer name | |
| 2 | Box details | |
| 2.1 | Material | |
| 2.2 | Top cover | |
| 2.2 | Overall dimensions | |
| 2.4 | Marking of terminations | |
| 2.5 | Adequate Space for future Communication modem installation | |
| 2.6 | Protection Class | |
| 2.7 | Enclosure lock | |
| 2.8 | Mounting Clamp | |
| 2.9 | Gland Plate | |
| 2.1 | Cable Gland | |



| Guaranteed Technical Particulars For Current Transformers | | | |
|---|---|---|---|
| Lot 9 (Item C): Current Transformer | | | |
| SL.No | Particulars | Bidders to Fill up | |
| | | Single Phase | Three Phase |
| 1 | **Reference Standard** | | |
| 2 | **Type** | | |
| 3 | **Capacity/Rating** | | |
| 3.1 | Rated Voltage | | |
| 3.2 | Rated Continuous Thermal current temperature rise over ambient | | |
| 3.3 | Rated Short Time Current | | |
| 3.4 | Transformation Ratio(s) | | |
| 3.5 | Rated Output Burden. | | |
| 3.6 | No. of Cores | | |
| 3.7 | One minute withstand Power Frequency Voltage. | | |
| 3.8 | Continuous Primary Current | | |
| 3.9 | One Minute withstand Power Frequency Voltage for Primary & secondary winding | | |
| 3.1 | ISF | | |
| 4 | **Class of Accuracy** | | |
| 5 | **Material** | | |
| 5.1 | Core | | |
| 5.2 | Conductor | | |
| 5.3 | Insulation | | |
| 6 | **Primary & Secondary Terminals** | | |
| 6.1 | Primary | | |
| 6.2 | Secondary terminal | | |



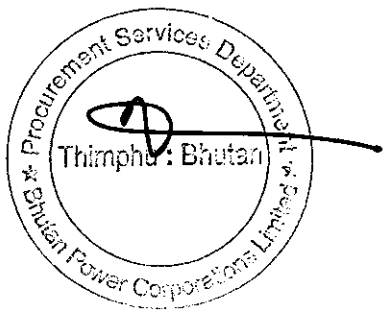
## Lot No. 9: Distribution Trasnformer Meters

**Brand Restricted to: Actaris(Itron); Iskrameco, Slovakia; Landis-Gyr, India; Secure Maters, India; Micro Star Electric Company Limited China**

| S.No. | Description | Unit | Quantity | Offered Brand and Country of Origin | Unit Rate in DDP (Nu) | Amount in DDP (Nu) |
|---|---|---|---|---|---|---|
| **A** | **DT Smart Grid Ready Meter Supply and Delivery** | | | | | |
| 1 | Single phase static transformer connected DT Meter 240V, -/5 of accuracy class 1 with associated accessories for successful pole mount installation as per the specifications. | Nos. | 962 | | | |
| 2 | Three phase static transformer connected DT Meter 415V, -/5 of accuracy class 0.5S with associated accessories for successful pole mount installation as per the specifications. | Nos. | 3918 | | | |
| **B** | **Meter Box Supply and Delivery** | | | | | |
| 1 | DT meter box for Single Phase as per the specifications mentioned including all the accessories for pole mount. | Nos. | 962 | | | |
| 2 | DT meter box for Three Phase as per the specifications mentioned including all the accessories for pole mount. | Nos. | 3918 | | | |
| **C** | **Current Transformers Supply and Delivery** | | | | | |
| 1 | Current transformers for Single Phase meters as per the specifications | LOT | 1 | | | |
| 2 | Current transformers for Three Phase meters as per the specifications | LOT | 1 | | | |
| **D** | **Software, Probe, Mobile workstation and Control Cables Supply and Delivery** | | | | | |
| 1 | Basic Computer Software as per the specifications | Nos. | 30 | | | |
| 2 | Software for local communication (HHU/CMRI/Computer) | Nos. | 30 | | | |
| 3 | Meter data API (*RESTful API*) | LOT | 1 | | | |
| 4 | Optical Probes for local communication as per the specifications | Nos. | 30 | | | |
| 5 | Mobile Workstation as per the specifications | Nos. | 1 | | | |
| 6 | A 5 core (2.5 sq.mm, as per relevant IEC Standard or IS) HRFR PVC insulated flexible multi strand control cables as per the specifications. | M | 15000 | | | |
| | A 7 core armoured (2.5 sq.mm, as per relevant IEC Standard or IS) HRFR PVC insulated flexible multi strand control cables as per the specifications. | M | 12000 | | | |
| | **Total Lot Amount (Nu.)** | | | | | - |

-

# Technical Specification
# for Lot 10
# (Numerical Relays)



## 1. Scope.

The feeder management relay shall be used for wide ranges of overhead lines and underground cables. This protection relay shall provide integral directional and non-directional over current, earth fault, over and under voltage and frequency protection functions.

In addition to protection features, this relay shall also provide full measurement and monitoring information for efficient maintenance and post fault analysis. The relay shall be communicated through several communications protocols such as IEC 60870-5-104 or Modbus or IEC 61850 for seamless interfacing to Remote Terminal Unit (RTU) for remote substation control and SCADA System. This relay shall be equipped with user friendly Human Machine Interfaces (HMI) and provide separate Setting Application Software for setting of relay.

Besides, numerical relay for primary Protection, Master Trip relay and Trip Circuit Supervision relay shall be provided where ever necessary.

## 2. Codes and Standards Applicable for Relay.

Unless otherwise specified elsewhere in this specification, the performance and testing of the relay shall conform to the following International/Indian Standards and all related International/Indian standards to be read with up-to-date and latest amendments/revisions, thereof:

| Codes | Descriptions |
|---|---|
| 2004/108/EC (demonstrated by EN60255-26:2009) | EMC compliance |
| 2006/95/EC (demonstrated by EN60255-27:2005 | Product safety |
| 99/5/EC | R&TTE Compliance |
| EN50263,IEC 60255-22-1/2/3/4/5/7, IEC 6000-4-5/6/8/9/10/16 EN61000-4-3/18,IEEE/ANSI C37.90.1/2/3, ENV50204,EN55022 | EMC |
| UL/CL File No. UL/CUL E202519 | Product Safety |
| IEC 60255-27:2005, IEC 600068-2-78:2001, -30:2005,-40:2003, | Environment conditions |
| IEC 60255-11, IEC 6100-4-11 | Power Supply Interruption |
| IEC 60255-27:2005 | Type test for insulation, Creepage distance and clearances, high voltage dielectric withstand, and impulse voltage withstand |
| IEC 60529:2002-IP10,IP30,IP52 | Enclosure Protection |
| IEC 60255-21-1/2/3 | Mechanical robustness |
| IEC 60255-151 | Documentations. |
| ESI 48-4 Class EB2 | High Burden Tripping Relay |

## 3. General Requirements of Protection Relay.

a) The price of the bid shall include whether explicitly mentioned or not, all the elements necessary to coordinate and assure the correct functioning of the

protection, high reliability, selectivity, very short fault clearance time, and precisely dimensioned to the protected objects under these technical specifications.

b) Modern relays employing state of the art technology & proven numerical design shall be offered by the bidder. They shall be of standard construction of the following approved makes. The relays shall be designed for use with modern digital telecommunication system conforming to ITU-T recommendations.
Approved make list for the relays are as the follows;

M/s GE/ALSTOM LTD.
M/s ABB LTD.
M/s SIEMENS LTD.

c) The type of relays/devices, which are implemented to perform a particular function, shall be the same for all feeders in each system voltage level within the contract in question.

d) Combination of two or more types of relays in a single unit is not normally acceptable since any fault or component failure may lead to loss of both or all functions respectively. However, when a modern integrated Numerical Multifunction Combined Protection equipment is offered, 100% redundancy shall be provided against the contingencies which lead to the loss of whole protection system.

e) In addition to all components, the supplier shall supply the *necessary documents and calculations of settings* to guarantee the correct functioning of the protection equipment without exceeding the safe limits of the system operation or the equipment condition.

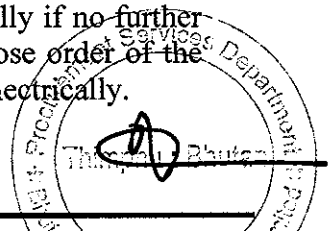
f) The continuity of all tripping circuits shall be continuously supervised for both close and open breaker status. The failure of any component of the supervision shall lead to trip the breaker. The lock out relays shall also be supervised.

g) No time delay for the tripping contacts will be acceptable. Where a master trip relay, lock-out relay or any auxiliary relay is utilized, it shall have a maximum tripping time equal to or less than 10ms. To avoid the additional time delay of the above relay on the total tripping time of the main protection, an arrangement shall be made so that the main protection shall perform the circuit breaker tripping along with energizing the lock-out relay in a parallel circuit arrangement.

h) All relays shall have clear identification by well-written inscription. Where indications are provided by flag relays or LEDs, these shall also be configurable at site as per requirement.

i) The supervision relays shall indicate an alarm and also a visual indication in the case of trip operation of the relay, DC supply failure, AC/DC converter failure, interruption in the trip circuit wiring and all alarm signals of the relay.

j) The tripping contacts of the protection relays shall reset automatically if no further fault conditions are present, whereas the signaling and blocking close order of the circuit breaker remains until the operator resets the relay manually/electrically.



k) Each indicator, whether of the electrical or mechanical type shall be capable of being easily reset locally or remotely or automatically without special tools, opening the relay cover, bridging of some back/internal terminals or drawing-out the relay.

l) The supplier shall supply the setting data sheets, latest setting application software, and wiring diagrams of the supplied protection equipment.

m) The supplier shall make sure that the relay should be compatible with other relays of different make incase need to retrofit in near future.

n) The supplier shall supply the relays in compliance with IEC 60255-27:2005 for ambient temperature, operating at -25° C to +55° C, IEC 60068-2-27:2007 and IEC 60068-2-30:2005 for ambient humidity and IEC 60068-2-42:2003, IEC 600068-2-43:2003 for corrosive environments.

o) The supplier shall supply the relay to operate at following general parameters as shown below:

| Parameters | Rating |
|---|---|
| **i. Power Supply** | |
| Nominal Operating Voltage | 24-250V DC +/-20%<br>110-240V AC -20% +10% |
| Maximum Operating Voltage | 19-300V DC |
| Frequency Range for AC Supply | 45-65 Hz |
| Ripple | Complaint with IEC60255-11:2008 |
| **ii. Current Transformer Inputs** | |
| Nominal Current (In) | 1A and 5A dual rated |
| Nominal Burden per phase | <0.05VA at In |
| **iii. Voltage Transformer Inputs** | |
| Nominal Voltage | 100V to 120V |
| Nominal Burden per phase | < 0.1 VA at Vn |

## 4. Specific Requirements for Relay.

### 4.1 Configurations

a) It shall be possible to programme and set the relays locally as well as from remote end. Necessary computer software to access and configure the relay locally/remotely shall be supplied. The software for configuration/setting shall be compatible for both hand-held programmable device as well as PC based unit.

b) The sampling frequency for analog signals shall be minimum 2 kHz. Filtering and measuring techniques shall be used to ensure correct performance during all operating and transient conditions.

c) The output and input sections shall be electrically isolated.

d) Under 'alarm' conditions of outputs, programmable options shall be available to set the output to trip /inactive/ none/ previous state condition.

e) A very flexible configuration of digital inputs and outputs along with "Setting Application Software" shall be provided for customization of setting and programmable logic as per site requirement.

### 4.2 Protection Functions

The directional, non-directional and differential relay shall provide wide range of protection functions, including but not limited to, as indicated below.

#### 4.2.1 Directional Relay

67(AC directional over current Relay), 50 (Instantaneous over current relay), 51 (Overload relay), 49 (Thermal overload relay), 37 (Undercurrent or Underpower Relay), 46 (Reverse phase / phase balance current relay), 67N (Neutral directional over current relay) 50N (Neutral instantaneous over current relay), 51N (Neutral time over current relay), 32 (Phase directional relay), 59N (Neutral over voltage relay), 27 (Under voltage relay), 59 (Over voltage relay), 50 BF (Breaker failure), 86 (Locking-out relay), 25 (Synchronizing or Synchronism-Check Device).

#### 4.2.2 Non-Directional Relay

50 (Instantaneous over current relay), 51 (Overload relay), 49 (Thermal overload relay), 46BC (Broken Conductor) 37 (Undercurrent or Under Power Relay), 46 (Reverse phase / phase balance current relay), 50N (Neutral instantaneous over current relay), 51N (Neutral time over current relay), 50 BF (Breaker failure), 86 (Locking-out relay).

#### 4.2.3 Differential Relay

87 (Differential Protective Relay), 50 (Instantaneous over current relay), 51 (Overload relay), 49 (Thermal overload relay), 27 (Under voltage relay), 59 (Neutral over voltage relay), 81 (Frequency relay), 24 (Volts-per-hertz relay/ over fluxing), 64 (restricted earth fault protection)

#### 4.2.4 Master Tripping Relay

The bidder shall supply the Master tripping relay having following features.

a) High burden tripping relay complying with ESI 48-4 Class EB2 Type.
b) Electrical and hand Reset contact mechanism.
c) Operate in DC supply.
d) Self and hand reset operation indicators.
e) Cut-off features of relay shall be instantaneous.
f) The outgoing contacts of relay shall be single 5 and Double 10.
g) Time delay shall be within 40ms to 60ms.

### 4.3 Measurements

The relay shall also measure the following analog parameters and same shall be made accessible from IEDs Menu, Setting Application Software, and SCADA system.

- Measured and calculated analogue current and voltage values.
- Power and Energy Quantities.
- Peak, fixed and rolling demand values.
- Frequency Measurements.
- Thermal Measurements.

### 4.4 Monitoring and Control

a) The non-volatile suitable memory shall be provided to store the events.

b) The relays shall be provided with fault disturbance event recorder, which can store minimum of 500 events with date and time stamping.

c) The event logs should capture opto-input events (change of state of opto-input), contact events (change of state of output relay contact), alarm events, fault record events, standard events (protection events, maintenance record events and platform events) and security events.

d) The disturbance recorder feature shall be provided to record the selected current and voltage input to protection elements together with selected digital signals.

e) The disturbance records shall be captured with minimum time duration of 0.1s and maximum time duration of 10.5s.

f) The event logs and disturbance records shall be displayed and viewed on an IED's front panel and can be downloaded using setting application software for carrying out the analysis on PC.

g) The measured and calculated analogue current and voltage values, power and energy quantities, peak, fixed and demand values, frequency and thermal measurement shall be captured by relay.

h) The records related to each breaker trip operation, allowing an accurate assessment of breaker condition shall be captured and the breaker condition monitoring counters shall increment every time device issues a trip command.

i) For setting the threshold for the total broken current, number of operations, operating time, and excessive fault frequency shall be provided.

j) The CB state monitoring logic shall be provided to verify the state of Circuit Breaker (Open or Close).

k) The circuit breaker shall be controlled both locally by IEDs Menu, Hotkeys, and Function keys (Opto-Input) and remotely by SCADA communications via relay.

l) Both the synchronization and CB healthy check shall be provided.

m) The modules shall have "transmitted" and "received" counters for each command such that the counter is incremented by actual output command. This shall help in analysis of problems. The counter information shall be in a non-volatile memory. Resetting the counter shall be possible only with authorized access.

n) The relay shall have continuous automatic self-monitoring and alarming facilities. The above feature shall not affect the relay availability i.e. when an actual fault occurs in the system during the checking cycle, the above cycle shall be immediately interrupted and the relay shall check and respond to the system fault. The system shall have the following visual indications for supervision of each command channel.

Input activated at transmit end, command transmitted and received, Equipment in local and remote loop test, Test pass, Test fail, General alarm, and Equipment in synchronism.

o) Each protection channel shall run an automatic loop test at regular intervals to monitor operational readiness. An unsuccessful test shall signal the alarm and block the command output. Also, if the system monitor detects any fault in the transmission, the protection command shall be blocked and alarm signalled.

### 4.5 Supervision

The relay shall provide trip circuit supervision with at least four Trip Circuit Supervision (TCS) schemes, DC supply monitor, voltage and current transformer.

### 4.6 Digital I/O and Analog Signals

a) The relay shall provide minimum of 8DO and 16 DI signals.
b) The DO/DI signal shall be configurable and customizable based on requirement.
c) The inputs and outputs of relay shall be allocated to specific application using Programmable Scheme Logic Editor (PSL) or Setting Application Software.
d) The optical isolated digital input (opto_inputs), output relays, programmable LEDs, Functions keys and Associated LED indications, and IEC61850 GOOSE digital input and outputs shall be providing and it shall be configurable.
e) The relay shall have required analog inputs signals ready to provide to RTU.

All these signals (DI/DO/AI signals) shall be easily available/accessible through local and remote communication ports defined below.

### 4.7 Communications

a) The connection from the relays to the communication port shall be with rear serial port 1 (RS485 port) using MODBUS data protocol for SCADA, and Remote Setting. The bidder shall indicate the maximum permissible distance and type of cable for this type of connection.

b) A rear Ethernet port with physical layer Ethernet/copper using IEC 61850 protocol for SCADA and Remote setting for redundancy purpose.

c) The relays shall have USB port at front for local setting and Firmware download using courier data protocols.

d) The relay shall ensure high dependability for genuine tripping signals and high security against spurious trip signals necessary in protection applications even if communication channel is disturbed.

### 4.8 Cyber security

The relay shall obey latest cyber security standards of existing international practices. The relay shall be fully secure from any possible cyber-threats and shall have the latest cyber security features (hardware/software/firmware) to avert any such threats.

### 4.9 Testing

#### 4.9.1 Type Test:

1) Supplier shall submit, along with bids, all Type Test Certificates as indicated below. Type test should be carried out as per applicable international standards in an accredited lap within last 7 years from the date of bid opening.
   - Temperature endurance test as per test method of IEC 60068-2-1 and IEC60068-2-2:
   - Insulation Test carried out in compliance to IEC 60255-27.
   - Creepage distances and clearances test in compliance with IEC60255-27.
   - High Voltage (Dielectric) withstand test in complaince with IEC60255-27 and ANSI/IEEE C37.90.
   - Impulse voltage withstand test in compliance with IEC60255-27.

#### 4.9.2 Routine & Acceptance Tests

Routine tests shall be carried out as per international standard. Apart from above test, the relay shall also be tested for all functional requirement including the communication aspects as the part of acceptance test. Full test procedures shall be reviewed and finalized before inspection of the said equipment. All the test procedures shall be submitted while seeking approval for Dispatch Clearance for supply of relay.

### 5. Training

The supplier/manufacturer should arrange five-day workshop or short course on setting, configuration, installation and commissioning of relay and all components before inspection. Only after the workshop or the course, inspection shall be carried out and the workshop or short course shall be free of cost. The supplier or manufacturer shall propose appropriate solution to facilitate the workshop or short course in event of natural and unavoidable global catastrophe.

**7. Inspection**

a) All relays shall be duly tested and sealed by the firm at their premises prior to inspection by employer representatives.

b) The employer shall carry out inspection only upon completion of workshop or short course mentioned in Training section of this document.

c) The Inspecting Officer of the Employer will inspect the relay as per sampling plan for acceptance test according to international standard. Apart from above test, the relay shall also be tested for all functional requirement through communication as part of acceptance test. After testing, these sample shall be additionally sealed by the inspecting officer and one copy of the inspection report will be handed over to the manufacturer.

d) The supplier or manufacturer shall propose appropriate solution to facilitate the inspection in events of natural and unavoidable global catastrophe.

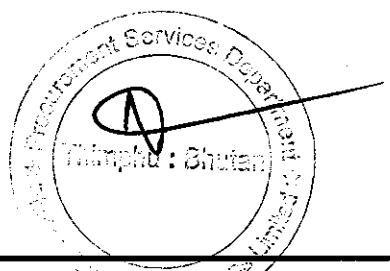
**8. Dispatch & Packaging**

Supplier shall dispatch the material after receiving written Material Dispatch Clearance (MDC) from the Purchaser.

The relay shall be suitably packed with good support to withstand handling during transport. The bidder shall be responsible for any damage during transit due to inadequate or improper packing. The relay shall be packed appropriately to ensure safe transportation, handling, identification and storage. All packing materials shall be environment friendly and not in conflict with law in force. The primary packing shall ensure protection against humidity, dust, grease and safeguard its performance until its installation. The secondary packing shall provide protection during transport. The packing case shall indicate "Fragile in nature" and direction of placement of box. Each packing shall indicate marking details like Manufacturer's name, Serial. No. of material, quantity, address of destination, etc.

**9. Transportation and Delivery**

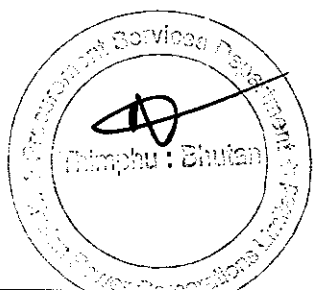
The relay shall not be exposed to undue shock and mishandling during transportation. The stacking of box inside transport media shall be such as to avoid their free movement. The packing should also be protected from rain and dust by transport media. The Bidder shall be responsible for any damage during transit due to inadequate or improper packing. All the transportation charges shall be included in items rate.



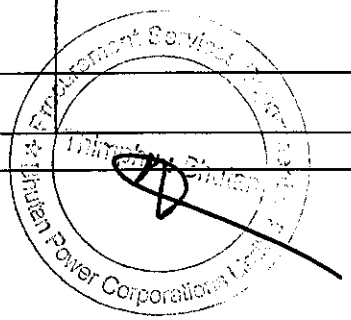
**10. Submission of Documents and Drawings**

The following information shall be submitted with the bid/approval/ pre-dispatch.

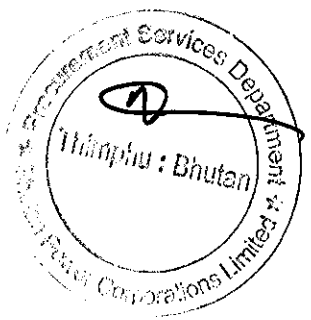
| Sl. No | Particulars | Bid | Approval | Pre-Dispatch |
|---|---|---|---|---|
| 1 | Wiring diagram (GA and schematic diagram) | | Required | |
| 2 | Guaranteed Technical particulars (GTP) | Required | | |
| 3 | Deviation Sheet, if any | Required | | |
| 4 | Detail of communication equipment/component | Required | | |
| 5 | List of all software and relevant accessories required for installation/ operation. | Required | | |
| 6 | Manufacturer's quality assurance plan and certification for quality standards | Required | | |
| 7 | Type Test reports | Required | | |
| 8 | Detailed installation and commissioning instructions including all product catalogues and user manuals. | | | Required |
| 9 | Performance Certificate | Required | | |
| 10. | All relevant standards certificates | Required | | |
| 11 | Display parameter | Required | | |
| 12 | Routine Test with procedures | | Required | Required |



| The supplier shall fill following table as a declaration of Guaranteed Technical Particular (GTP). | | | | | |
|---|---|---|---|---|---|
| **Lot 10 : Numerical Relays** | | | | | |
| **Sl.No.** | **Item Description** | **Bidders to fill up** | | | |
| | | **Numerical Directional Overcurrent & Earth Fault Relay** | **Numerical Non-Directional Overcurrent & Earth Fault Relay** | **Numerical Differential Relay** | **Master Tripping Relay** |
| **A. Electrical** | | | | | |
| 1 | Nominal Operating Voltage (DC) | | | | |
| 2 | Nominal Operating Voltage (AC) | | | | |
| 3 | Maximum Operating Voltage | | | | |
| 4 | Frequency Rage for AC Supply | | | | |
| 5 | Ripple | | | | |
| 6 | Nominal Current (In) | | | | |
| 7 | Nominal Burden per phase | | | | |
| 8 | Nominal Voltage | | | | |
| 9 | Nominal Burden per phase | | | | |
| **B. Communication** | | | | | |
| 10 | Data Transmission Rate | | | | |
| 11 | Communication Ports | | | | |
| 12 | Communication protocol with RTU | | | | |
| 13 | Analog data transfer to Master Station | | | | |
| 14 | Sequence of Events (SOE) buffer size | | | | |
| **C. Protection Details** | | | | | |



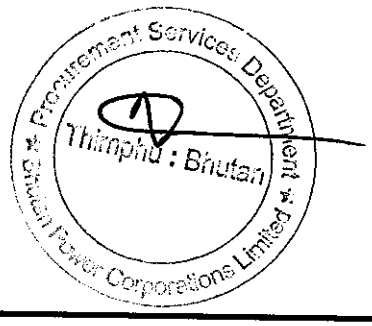
| Sl.No. | Item Description | Bidders to fill up | | | |
|---|---|---|---|---|---|
| | | **Numerical Directional Overcurrent & Earth Fault Relay** | **Numerical Non-Directional Overcurrent & Earth Fault Relay** | **Numerical Differential Relay** | **Master Tripping Relay** |
| 15 | Details Protection Provided by Numerical Directional Over Current &Earth Fault Relay | | | | |
| 16 | Details Protection Provided by Numerical Non-Directional Over Current & Earth Fault Relay | | | | |
| 17 | Details Protection Provided by Numerical Differential Relay | | | | |
| **D. Master Tripping Relay** | | | | | |
| 18 | Tripping Type | | | | |
| 19 | Contact Mechanism Reset Type | | | | |
| 20 | Operation Indicator Reset Type | | | | |
| 21 | Cutoff Features of Relay | | | | |
| 22 | Available outgoing Contact | | | | |
| 23 | Time delay | | | | |



| Lot No. 10: Numerical Relay | | | | | | |
|---|---|---|---|---|---|---|
| **Sl.No** | **Description** | **Unit** | **Qty.** | **Offered Brand and Country of Origin** | **Unit Rate in DDP (Nu)** | **Amount in DDP (Nu)** |
| 1 | Design, manufacturing, testing, supply and delivery of indoor mounted Numerical Directional Overcurrent & Earth Fault Relay including all necessary accessories as per tech specs. | Set | 28 | | | |
| 2 | Design, manufacturing, testing, supply and delivery of indoor mounted Numerical Non-Directional Overcurrent & Earth Fault Relay including all necessary accessories as per tech specs. | Set | 51 | | | |
| 3 | Design, manufacturing, testing, supply and delivery of indoor mounted Numerical Differential Relay including all necessary accessories as per tech specs. | Set | 2 | | | |
| 4 | Design, manufacturing, testing, supply and delivery of indoor mounted, high burden, DC operated master tripping relay including all necessary accessories as per tech specs. | Set | 190 | | | |
| **Total Lot Amount (Nu.)** | | | | | | |

Procurement Services Department * Bhutan Power Corporation Limited * Thimphu : Bhutan

# Technical Specifications for Lot 11 (Sectionalizer)



## 1 Scope

1.1 The specification covers the design, manufacturing, testing, supply and delivery of outdoor pole mounted SCADA compatible Sectionalizer suitable for line voltage of 11kV and 33kV with bidirectional communication facility.

1.2 For Local Communication/configuration via craft terminal or Hand-Held-Unit (HHU), the Sectionalizer shall serial/TCP-IP port for communication. For remote communication the sectionalizer shall have TCP/IP (Ethernet) port(s) in congruent with IEC 60870-5-104 to facilitate communication with Control center / Data Concentrator Unit (DCU) / MDAS.

1.3 Sectionalizer shall have separate appropriate lightning arrestor with all accessories shall be provided.

1.4 Sectionalizer shall include programmable protection features and integrated remote operation capability that are intended for installation on 3-phase11kV and 33kV feeders to facilitate complete distribution automation.

1.5 The Sectionalizer control panel shall either have an auxiliary power supply supplied by single phase dry type resin cast transformer. A rechargeable battery and battery charger shall also be provided to provide stable power source to the controller and other communication equipment. The battery must be easily available in the market and specially designed or vendor specific battery will not be accepted.

1.6 Sectionalizer shall be connected to its controller using suitable connector by means of umbilical cable or equivalent cable. The bidder should provide hardware and clamping structures, conductors and paraphernalia wherever required.

1.7 Spring type operating mechanism shall be provided for the sectionalizer.

## 2 Standards applicable for Sectionalizer

Unless otherwise specified elsewhere in this specification, the performance and testing of the sectionalizer shall conform to, but not limited to, the following International Standards and all related International standards to be read with up to-date and latest amendments/revisions, thereof:

| Sl. # | Standard No. | Title |
|---|---|---|
| 1 | IEEE C37.63 | Requirements for Overhead, Pad-Mounted, Dry Vault, and Submersible Automatic Sectionalizer |
| 2 | IEC 60265 | High voltage switches for rated voltage below 52kV |
| 3 | IEC 62271 – 200 | AC Metal-enclosed switchgear and control gear for rated voltages above 1kV and up to and including 52kV |
| 4 | IEC 60255 | Electrical Relay standards |
| 5 | IEC 60529 | Degree of protection provided by enclosures |
| 6 | IEC 61000-4-2 | Electrostatic Discharge standard |
| 7 | IEC 61000-4-3 | Radiated electromagnetic field |
| 8 | IEC 61000-4-4 | Electrical fast transient/burst immunity test |
| 9 | IEC 61000-4-5 | Surge immunity |
| 10 | IEC 61000-4-6 | Immunity to Conduced Disturbances |
| 11 | IEC 61000-4-8 | Power Frequency Magnetic Field |
| 12 | IEC 61000-4-11 | Voltage dips, short interruptions and voltage variations immunity tests |
| 13 | IEC 61000-4-16 | Conducted common mode disturbances |
| 14 | IEC 61000-4-18 | Damped oscillatory wave |
| 15 | IEC 60068-2-6 | Vibration in three axes |
| 16 | IEC 60071-1 | Insulation coordination |

## 3 Environmental conditions

All materials supplied shall be capable of operating under following environmental conditions

| Sl No. | Particulars | Unit | Value |
|---|---|---|---|
| 1 | Minimum ambient temperature | °C | -20 |
| 2 | Maximum ambient temperature | °C | +40 |
| 3 | Relative humidity | % | 0 to 100 |
| 4 | Altitude | m above sea level | At least 3000 |

## 4 General operating parameters

General operating parameters required for the sectionalizers are as shown in the table below

| Sl # | Particulars | 33kV | 11kV |
|---|---|---|---|
| 1 | Rated System Voltage | 33kV | 11kV |
| 2 | Maximum voltage | 36kV | 12kV |
| 3 | Applicable Standard | IEEE C37.63/IEC 60265 | |
| 4 | Type | Outdoor, pole mounted | |
| 5 | Frequency | 50 Hz | |
| 6 | Rated Power Frequency withstand Voltage (kV) | 70 | 28 |
| 7 | Rated Lightning impulse withstand Voltage (kV) | 170 | 75 |
| 8 | Rated continuous current(Amps) | 400 | |
| 9 | Fault make capacity (RMS)-kA | Minimum of 12.5 | |
| 10 | Fault make capacity (Peak )-kA | Minimum of 31.5 | |
| 11 | Detection Features (Minimum) | Overcurrent | |
| | | Earth fault | |
| | | Sensitive Earth Fault | |
| | | Directional blocking | |
| 12 | Measurement features (Minimum) | Voltage | |
| | | Current | |
| | | Frequency | |
| | | Power | |
| | | Power Factor | |
| | | Energy (kwh) | |
| 13 | Basic Communication features | Serial/TCP IP & USB port for local communication/configuration | |
| | | TCP/IP port for remote communication | |
| 14 | Communication protocol | IEC 60870-5-104 for remote communication | |
| 15 | Mechanical operating life | Minimum of 3,000 operations | |

*Above values are the standard values at 1000 meters ASL. For installing at an altitude higher than 1000 m, the insulation withstand level of external insulation and the clearances shall be defined by the bidder considering altitude correction factor in accordance with an altitude as given in the Clause 3 (Environmental Conditions).*

## 5 Testing

### 5.1 Type Tests & Test Certificates

Sectionalizers shall be type tested for all the type tests as per applicable international standards in an accredited lab within last 10 years from the date of bid opening.

Bidder shall submit, along with tender, all Type Test Certificates as per international standards with relevant amendments.

### 5.2 Routine & Acceptance Tests

The Factory Acceptance Test and Routine test shall be carried out as per applicable international standards in presence of purchaser or her representatives. Apart from standard routine test, sectionalizer shall also be tested for all functional requirement through communication as part of acceptance test.

## 6 Mounting features of Sectionalizers

The Sectionalizer shall be suitable for mounting on existing double pole and suitable mounting bracket shall be provided with appropriate lifting lug provided at appropriate position (drawing of existing pole is attached in Annexure). There shall be suitable mounting brackets for surge arrestor as well and all associated nut and bolts shall be galvanized. The terminals bushings of sectionalizer shall have laser cut markings indicating incomer side and load side with separate and distinct mark. Means shall be provided to permit manual operation of the sectionalizer through operating rod or built in extensible lever system from the ground level. The control panel for sectionalizer shall be mounted on the pole and suitable bracket shall be provided accordingly.

## 7 Bushing terminals

The material for bushing shall be outdoor Cycloaliphatic epoxy resin / hydrophobic Cycle aliphatic epoxy / HECP and preferred arrangement for connection to overhead conductor is using crimp lugs with holes. The creepage distance should be as per international standards and Silicon rubber boots should be provided wherever needed. All components of the equipment shall be de-rated as per applicable international standards.

## 8 Finish

All interior and exterior ferrous surfaces of sectionalizer and control cabinets shall be manufactured from 304 or better grade stainless steel.

## 9 Switching Equipment

9.1 The pole mounted outdoor type sectionalizer shall have Current Transformer, Capacitive Voltage Transformer and vacuum interrupter contained in the outdoor circuit switching unit.

9.2 The current transformer shall be as per applicable international standards with appropriate ratio of 300/1A for 11kV and 150/1 for 33kV with 5P protection accuracy class. This shall be able to detect and record the lowest line current in a rural feeder at any instant of time. A capacitive voltage transformer meeting service requirements as per international standard shall be available to measure the voltage.

9.3 There shall be manual trip / close or lock options provided externally in the events of faults or line maintenance. The supplier or manufacturer shall also supply properly insulated hotstick or any items required for manual operation.

9.4 The sectionalizer shall be provided with position indicator, or other suitable means, which will clearly indicate the position OFF and ON and the indicator shall be visible from the ground.

9.5 All accessories required for switching components shall be supplied

## 10 Control equipment

10.1 The pole mounted weather proof outdoor control cabinet for sectionalizer shall be manufactured from 304 or better grade stainless steel and house battery, battery charger, switches, controller and other required communication equipment.

10.2 The control cabinet shall be connected to the sectionalizer with multi-pin weatherproof connector using 5 meters long umbilical cable or equivalent or ultraviolet-resistant cable with cable gland wherever required. It shall be possible to disconnect the cable when sectionalizer is connected to power system, without causing damage or malfunction.

10.3 Control cabinet shall be adequately sealed with ingress protection rating of IP55 or better.

10.4 The supplier shall ensure that the equipment housed in the control cabinet can withstand the heating effect of direct solar radiation without causing failure and/or malfunction.

10.5 Cabinet shall have additional provision for bottom entry of three cables and all holes shall be pre-punched and suitably blanked off. There should be another provision of bottom entry for the cable connection to sectionalizer.

10.6 The cabinet shall have ventilation holes to avoid hydrogen build-up inside the cabinet.

10.7 The door of the cabinet should be fitted with a secure and robust locking arrangement and there should be minimum of two hinge points. The door should be removable for replacement at site and door stay shall be fitted to keep door open while operators are attending the unit.

10.8 There shall not have any sharp edges and there shall not be any danger of pinching or guillotining an operator's fingers or hands inside the cabinet.

10.9 All connections that could potentially expose the operator to dangerous voltages will be shielded as per applicable standards. These connections include the terminals used for current transformers, primary power supply and voltage measurement inputs.

10.10 The controller, upon opening of panel's door, shall also have push button easily accessible for manual trip and close from control panel.

10.11 The controller shall be equipped with standard size Liquid Crystal Display to access

- Close/open operation log
- View configuration or setting
- View event log and messages
- View, modify and change configuration or setting

10.12 There shall be toggle buttons available to select, move up, move down, move left and move right. There shall also be local/remote selector button available with the controller.

10.13 All accessories required for control circuit shall be supplied.

**11 Detection characteristics**

11.1 The sectionalizer shall have electronic control unit with at least 4 independent detection group settings that shall detect following parameters.

| Sl. No. | Detection type |
|---|---|

| | |
|---|---|
| 1 | Phase Instantaneous overcurrent |
| 2 | Earth Instantaneous overcurrent |
| 3 | Phase time overcurrent |
| 4 | Earth time overcurrent |
| 5 | Sensitive Earth Fault |
| 6 | Earth fault |
| 7 | Directional blocking |

11.2 The ratio of drop-off current to pick-up current shall be at least 90 % for all protection functions.

11.3 The Overcurrent pickup setting shall be programmable and selectable from 2% to 100% of the current transformer.

11.4 SEF a primary earth fault current of 4A to 20A in steps not exceeding 1A shall be detectable.

11.5 The sectionalizer shall have minimum 4 independent detection groups. The detection groups shall have clear indication and shall be marked as "I, II, III, IV" or "A, B, C, D" or "1, 2, 3, 4"

11.6 Each detection group shall have the facility to configure O/C, E/F and SEF detection current.

11.7 Changes to any of the detection parameter to any of the not active detection group shall not affect the detection functionality of the active detection group.

11.8 Information about activation of any of the protection group shall be recorded in history and shall be easily assessable. Information about fault detection shall clearly indicate the detection group, active at the time of fault.

11.9 Automatic detection group selection shall have the facility to be turned ON or OFF with password protection or other form of access control.

**12 Sectionalizer Operation parameter**

12.1 Total number of counts to opening, adjustable to 1, 2, 3 or 4. Each instantaneous and delayed interruption of back-up device will be counted individually.

12.2 The sectionalizer counts each interruption of the back-up re-closing device and will open after a pre-set number of counts have been registered. The sectionalizer shall only lock-out during the open interval of the re-closing back-up device.

12.3 Reset times shall ideally be separately selectable from 5s to 120s in 1s steps.

12.4 Software required for any components shall be provided without any additional cost

## 13 Sectionalizer Measurement characteristics

13.1 Measurement of following parameters shall be done and there shall be option to communicate these measurements to control center.

| Sl. No. | Measurement values | Unit |
|---|---|---|
| 1 | Phase Voltage | V |
| 2 | Line Voltage | V |
| 3 | Phase Current | A |
| 4 | Active power | kW |
| 5 | Apparent Power (kVA) | kVA |
| 6 | Reactive power (kVAR) | kVAR |
| 7 | Power Factor | |
| 8 | Energy | kwh |
| 9 | Daily Peak load (time stamped) | kW |
| 10 | Outage duration count | Nos |
| 11 | Outage duration | Seconds |

13.2 The number, duration of outages and cumulative values shall be recorded and shall be accessible locally or it shall have option to access it remotely using SCADA system.

## 14 Local engineering

14.1 The sectionalizer controller shall have a real time clock with leap year taken into account and the clock shall be settable both locally and remotely.

14.2 A facility for selecting all the detection, operating and communications characteristics shall be locally available in the control cabinet. Optional password protection against unauthorized changes shall be available.

14.3 The controller shall be provided with non-volatile memory storage that shall have capacity to store at least 3000 logs. The log shall be including, but not limited to, all operating, detection and communication parameters, event recording of at least 3000 events, all changes in setting and measurement values.

14.4 A pointer shall be provided to indicate up to where the data was last read. This will enable regular uploading or downloading of the data without re-loading of previously read data.

14.5 All events shall be time and date stamped with real time clock.

**15 Tele control and communication**

15.1 The sectionalizer controller shall detect and report disconnection of the control cable between the controller and actual sectionalizer.

15.2 It shall be possible to operate sectionalizer, change the active detection group, turn sectionalizer capabilities ON/OFF and turn E/F and SEF ON/OFF remotely using standard protocol.

15.3 There shall be minimum of one independent serial communication ports & one Ethernet communication ports that allow simultaneous operation.

15.4 The protocol to be supported by the controller for remote communications shall be IEC 60870-5-104.

15.5 The software required for any equipment shall be provided without additional cost

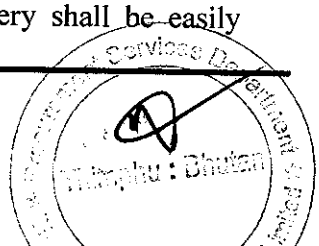
15.6 All accessories required for communication shall be supplied.

**16 Power supply**

16.1 Power supply to the electronics, controller operation, operation of sectionalizer and communication equipment shall be from auxiliary power source by use of dry type resin cast single phase transformer appropriate voltage ratio.

16.2 Rechargeable Li-ion/Lithium iron phosphate Battery and constant voltage charger with current limiting shall be provided as part of sectionalizer. The battery shall be easily





available in the market and specially designed battery or vendor specific battery shall not be accepted. Battery standalone time shall not be less than 24 hours and shall allow for a minimum of five (5) sequences of LRC trip-close operations. The battery shall recharge to 80 % of its capacity in a maximum of 15 hours. Battery low indication shall be available locally and remotely and minimum life expectancy of the battery shall be 5 years.

16.3 All accessories required for power supply shall be supplied.

**17 Maintenance and commissioning**

17.1 All the communications equipment shall be easily accessible in the control cabinet. It shall be possible to perform secondary injection testing while the sectionalizer is communicating with the center.

17.2 The sectionalizer shall not malfunction while the modem is transmitting via an antenna in close proximity and the control cabinet door is open

17.3 Provision shall be made in the control cabinet for individually isolating the power supply to/from the battery, battery charger, communication equipment and primary supply source to control cabinet

**18 Rating plate**

Sectionalizer shall bear a name plate clearly visible, effectively secured against removal and indelibly and distinctly marked in-accordance with international standard. In addition, the words **'Property of BPCL'** along with the Purchase Order No. and year/month of manufacture, "Guarantee Years" shall either be punched or marked indelibly on the name plate. The equipment shall not be accepted if anything other than the aforementioned words and logo or name of manufacturer are found on the nameplate.

**19 Training**

The supplier/manufacturer should arrange a week long workshop or short course on setting, configuration, demonstration on setting up communication, installation and commissioning of sectionalizer and all components before inspection. Only after the workshop or the course, inspection shall be carried out and the workshop or short course shall be free of cost to the

purchaser. The supplier or manufacturer shall propose appropriate solution to facilitate the workshop or short course in events of natural and unavoidable global catastrophe.

**20 Inspection**

20.1 The materials shall be subjected to all its routine inspections and tests as per relevant international standards. The supplier shall give the purchaser two weeks written notice of the materials being ready for testing. Unless the test is waived off, the purchaser shall attain such test on the scheduled date for which purchaser has been so notified or on a mutually agreed alternative date. If the purchaser fails to attain the testing on the mutually agreed date, supplier may proceed with the test which shall be deemed to have been made in the presence of purchaser and supplier shall forthwith forward to the purchaser duly certified copies of the test results.

20.2 The employer shall carry out inspection only upon completion of workshop or short course mentioned in Training section of this document.

20.3 The Inspecting Officer of the Employer will inspect the sectionalizers as per sampling plan for acceptance test according to international standard. Apart from above test, the sectionalizer shall also be tested for all functional requirement through communication as part of acceptance test. After testing, these sample shall be additionally sealed by the inspecting officer and one copy of the inspection report will be handed over to the manufacturer.

20.4 The supplier or manufacturer shall propose appropriate solution to facilitate the inspection in events of natural and unavoidable global catastrophe.

**21 Packing and Transportation**

The sectionalizer shall be suitably packed for vertical/horizontal support to withstand handling during transport. The bidder shall be responsible for any damage during transit due to inadequate or improper packing. The sectionalizer shall be packed appropriately to ensure safe transportation, handling, identification and storage. All packing materials shall be environment friendly and not in conflict with law in force. The primary packing shall ensure protection against humidity, dust, grease and safeguard its performance until its installation. The secondary packing shall provide protection during transport. The packing case shall indicate "Fragile in

nature" and direction of placement of box. Each packing shall indicate marking details like Manufacturer's name, Serial. No. of material, quantity, address of destination, etc.

The sectionalizer shall not be exposed to undue shock and mishandling during transportation. The stacking of box inside transport media shall be such as to avoid their free movement. The packing should also be protected from rain and dust by transport media. The Bidder shall be responsible for any damage during transit due to inadequate or improper packing.

**22 Delivery**

22.1 All components of the equipment shall be delivered to Regional Stores Division, Phuentshogling, BPC.

22.2 Bidder shall dispatch the material, only after the successful completion of Routine Tests/Factory Acceptance Test (FAT) witnessed by the purchaser and after receiving written material dispatch clearance from purchaser.

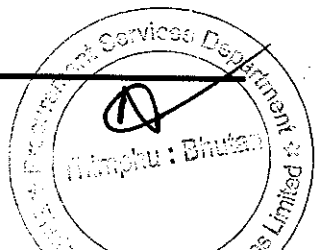
**23 Submission of documents and drawing**

The following information shall be submitted at following stages.

| Sl.No | Particulars | Bid | Approval | Pre-Dispatch |
|---|---|---|---|---|
| 1 | Details of switching equipment | Required | | |
| 2 | Wiring diagram (GA and Schematic diagram) | | Required | |
| 3 | General arrangement for installation on double pole | | Required | |
| 4 | Procedures for maintenance and operation of all components | | | Required |
| 5 | Details of service history | Required | | |
| 6 | Guaranteed Technical Particulars (GTP) | Required | | |
| 7 | Deviation Sheet, if any | Required | | |
| 8 | List of software and accessories required for installation/configuration/operation. | Required | | |
| 9 | Manufacturer's certification for quality standards and performance certificate | Required | | |
| 10 | Type Test reports | Required | | |
| 11 | Routine test reports with procedures | | Required | Required |

| | | | | |
|---|---|---|---|---|
| 12 | Detailed manual for installation and commissioning instructions including product catalogue and user manuals | | | Required |
| 13 | Details of lighting arrestor | Required | | |
| 14 | Details of battery | Required | | |
| 15 | Mounting details of control cabinet | | Required | |
| 16 | Mounting details of switching equipment | | Required | |
| 17 | Details of CT and CVT | Required | | |





**Annexure: Drawing of existing pole**

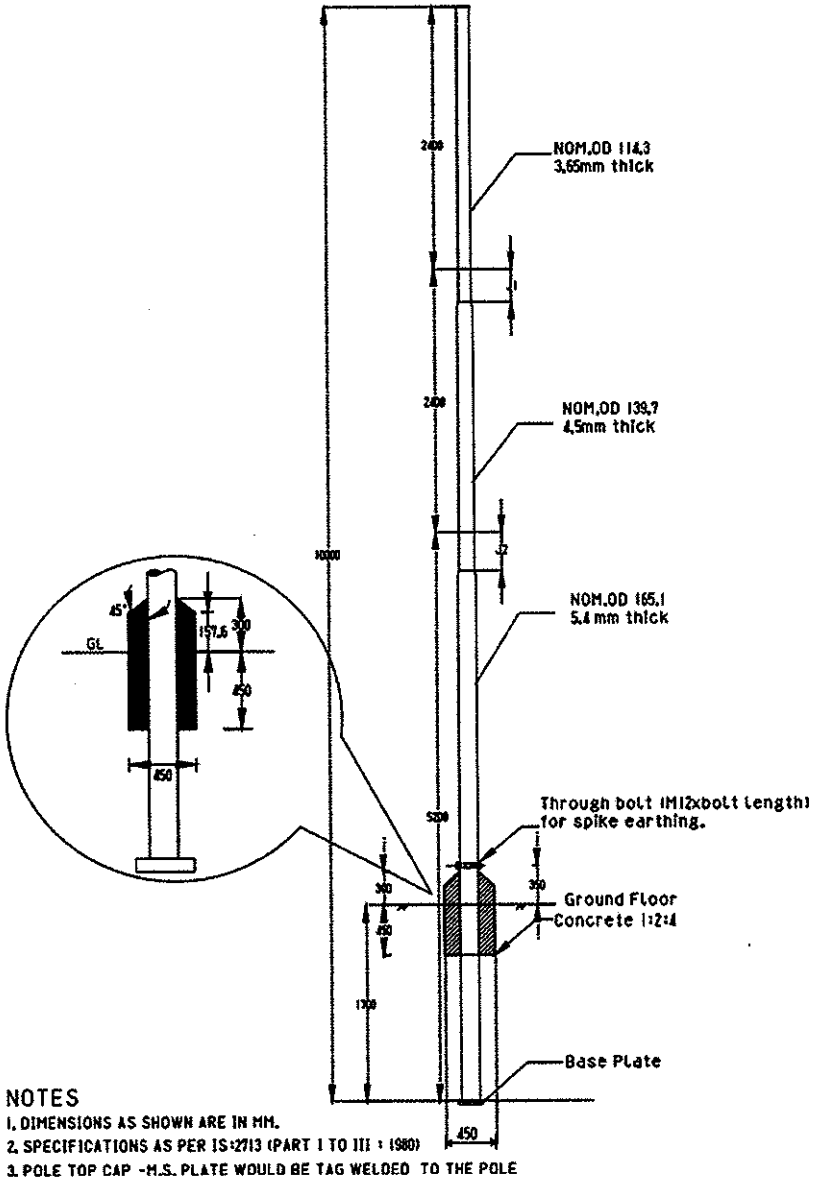
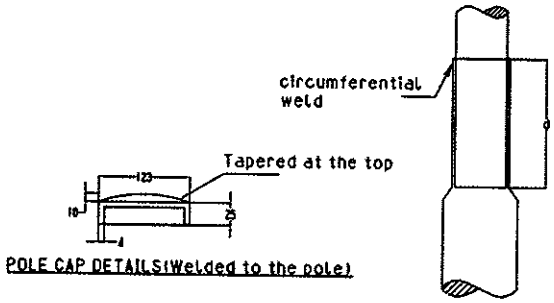
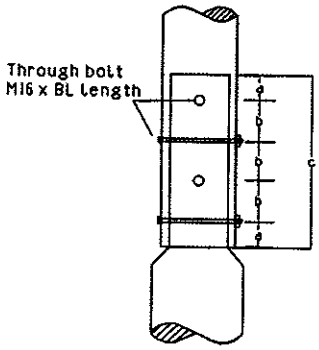



**Figure 1: Dimension of single steel tubular pole**

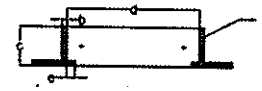


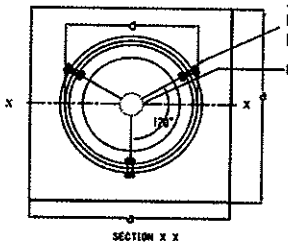

POLE CAP DETAILS(Welded to the pole)

WELDED JOINT J1 DETAILS




BOLTED JOINT J2 DETAILS



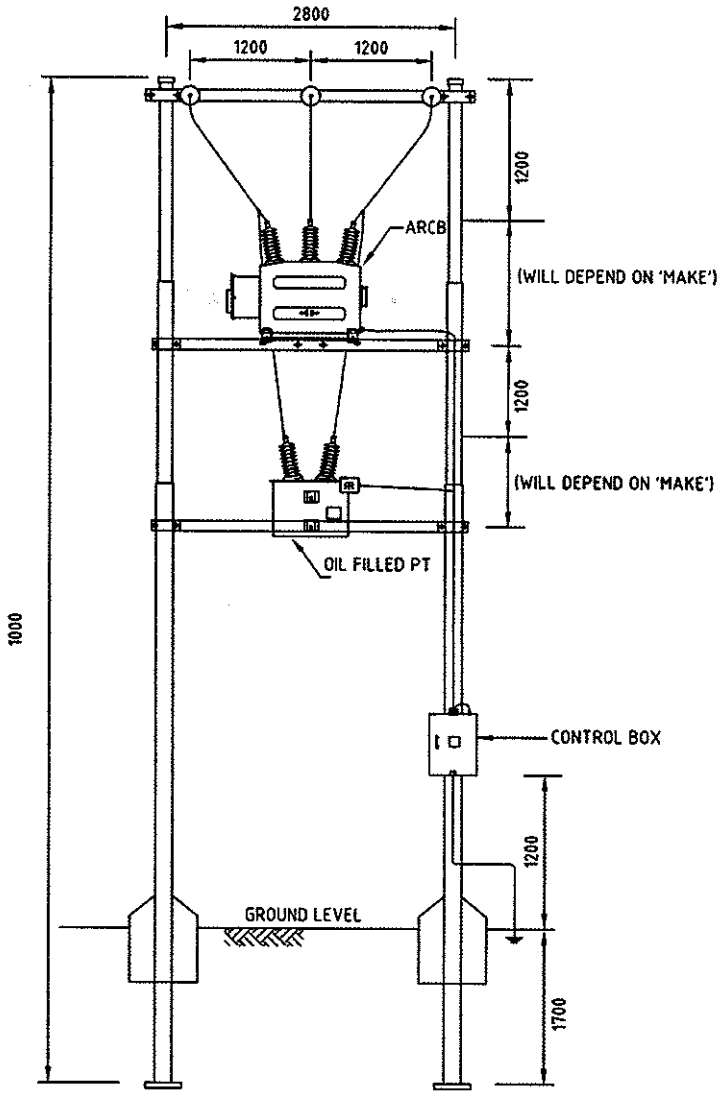

DETAILS OF MS BASE PLATE (Seperately packed)

| Pole Type | | | 10 M (410-SP-85) |
|---|---|---|---|
| Length | | mm | 10000 |
| Top Segment | OD | mm | 114.3 |
| | Thickness | mm | 3.65 |
| | Length | mm | 2400 |
| Middle Segment | OD | mm | 139.7 |
| | Thickness | mm | 4.5 |
| | Length | mm | 2400 |
| Bottom Segment | OD | mm | 165.1 |
| | Thickness | mm | 5.4 |
| | Length | mm | 5200 |
| Joint J1 | Welded Joint | | |
| | d | mm | 300 |
| Joint J2 | a | mm | 95 |
| | b | mm | 80 |
| | c | mm | 350 |
| | BL | mm | 180 |
| Planting Depth | | mm | 1700 |
| Base plate details | a | mm | 250 |
| | b | mm | 6 |
| | c | mm | 90 |
| | d | mm | 165.1 |
| | e | mm | 10 |

NOTES

1. DIMENSIONS AS SHOWN ARE IN MM.
2. DRAWING NOT TO SCALE.
3. SPECIFICATIONS AS PER IS:2713 (PART I TO III : 1980)
4. POLE TOP CAP -M.S. PLATE WOULD BE TAG WELDED TO THE POLE

**Figure 2: Details of joints and other dimensions**

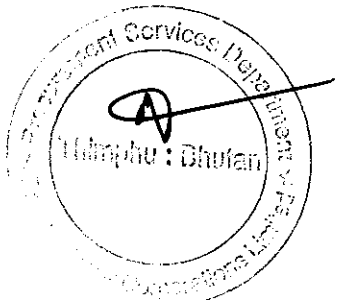



NOTES

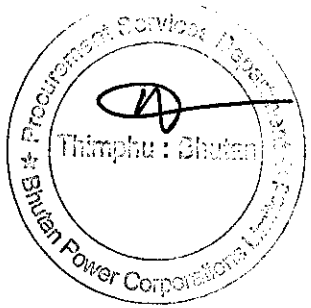
1. DIMENSIONS AS SHOWN ARE IN mm.
2. DRAWING IS NOT TO SCALE.

**Figure 3: Two single steeel tubular poles used as double pole for installation of Sectionalizer**

| The supplier shall fill following table as a declaration of Guaranteed Technical Particular (GTP) | | | | |
|---|---|---|---|---|
| **Lot 11 : Sectionalizer** | | | | |
| **Sl. No** | **Particulars** | **Unit** | **Bidder's Offer** | |
| | | | **11kV** | **33kV** |
| A. Environmental condition | | | | |
| 1 | Minimum ambient temperature | Deg C | | |
| 2 | Maximum ambient temperature | Deg C | | |
| 3 | Relative humidity | % | | |
| 4 | Maximum altitude | m above sea level | | |
| B. Switching Equipment | | | | |
| 1 | Rated power frequency withstand voltage | kV | | |
| 2 | Rated lightning impulse withstand voltage | kV | | |
| 3 | Rated continuous current | A | | |
| 4 | Fault make capacity (RMS) | kA | | |
| 5 | Fault make capacity (Peak) | kA | | |
| 6 | Minimum mechanical life | Operations | | |
| 7 | Frequency | Hz | | |
| C. Control equipment | | | | |
| 1 | Minimum Degree of protection | | | |
| 2 | Material of cabinet | | | |
| 3 | Memory type | | | |
| 4 | Memory capacity | | | |
| D. Communication | | | | |
| 1 | Communication Protocol | | | |
| 2 | Communication ports available | | | |
| 3 | Minimum Data transmission rate | Baud rate | | |
| | | Mbps | | |
| E. Power supply | | | | |
| 1 | PT voltage ratio | V | | |
| 2 | Minimum Battery life | Years | | |
| 3 | Battery make and model | | | |
| 4 | Battery type | | | |
| 5 | Battery charger type | | | |
| 6 | Battery charger make and model | | | |
| 7 | Input voltage | V | | |
| 8 | Output voltage | V | | |
| F. Lightning Arrestor | | | | |
| 1 | kV rating | kV | | |
| 2 | kA rating | kA | | |
| 3 | MCOV | kV | | |
| G. Current transformer | | | | |
| 1 | Primary current | A | | |
| 2 | Secondary current | A | | |
| 3 | Burden | VA | | |
| 4 | Accuracy class | | | |



| Lot No. 11: Sectionalizer | | | | | | |
|---|---|---|---|---|---|---|
| **Sl. No** | **Description** | **Unit** | **Qty** | **Offered Brand and Country of Origin** | **Unit Rate in DDP (Nu)** | **Amount in DDP (Nu)** |
| 1 | Design, manufacturing, testing, supply and delivery of outdoor pole mounted SCADA compatible Sectionalizer and associated accessories suitable for line voltage of 11kV as per technical specification | Set | 8 | | | |
| 2 | Design, manufacturing, testing, supply and delivery of outdoor pole mounted SCADA compatible Sectionalizer and associated accessories suitable for line voltage of 33kV as per technical specification | Set | 24 | | | |
| **Total Lot Amount (Nu.)** | | | | | | |



# PART 3- Contract

## Section VI. General Conditions of Contract

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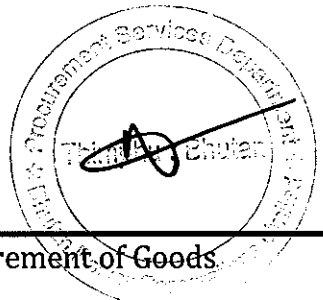

## Section VI. General Conditions of Contract (GCC)

| 1. | Definitions | |
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| | | |
| 1.1 | In this Contract, unless the contract otherwise requires, the term: | |
| | (a) | "The Contract" means any lawful agreement entered into between the Purchaser and the Supplier, as recorded in the Contract Agreement signed by the parties, including all attachments and appendices thereto and all documents incorporated by reference therein. |
| | (b) | "Contract Documents" means the documents listed in the Agreement, including any amendments thereto. |
| | (c) | "The Contract Price" means the price payable to the Supplier as specified in the Contract Agreement, subject to such additions and adjustments thereto or deductions therefrom as may be made pursuant to the Contract. |
| | (d) | "The Goods" means all the equipment, machinery, and/or other materials, which the Supplier is required to supply to the Purchaser under the Contract. |
| | (e) | "The Services" means those services ancillary to the supply of the Goods, such as transportation and Insurance, provision of technical assistance, training, and other such obligations of the Supplier covered under the Contract. |
| | (f) | "The Purchaser" means the entity purchasing the Goods and Related Services, as specified in the SCC. |
| | (h) | "The Supplier" means the individual or firm supplying the Goods and Services under the Contract. |
| | (i) | "Day" means calendar day. |
| | (j) | "Delivery" means the transfer of the Goods from the Supplier to the Purchaser in accordance with the terms and conditions set forth in the Contract Documents. |
| | (k) | "SCC" means Special Conditions of Contract. |
| | (l) | "Subcontractor"meansany natural person, private or government entity, or a combination thereof, including its legal successors and permitted assigns, to whom any part of the Goods to be supplied or execution of any part of the Related Services is subcontracted by the Supplier. |
| | (m) | "Incoterms' means a series of international sales terms, published by the International Chamber of Commerce (ICC) in Paris, France. |

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| **2.** | **Use of Contract Documents and Information** | |
| | | |
| 2.1 | The Supplier shall not, without the Purchaser's prior written consent, disclose the Contract, or any provision thereof, orany specification, drawings, pattern, sample or information furnished by or on behalf of the Purchaser in connection therewith, to any person other than a person employed by the Supplier in the Performance of the Contract. Disclosure to any such employed person shall be made in confidence and shall extend only so far as may be necessary for purposes of such performance. | |
| 2.2 | The supplier shall not, without the Purchaser's prior written consent, make use of any document or information specified in GCC Clause 2.1 above, except for purposes of performing the Contract. | |
| 2.3 | Any document, other than the Contract itself, specified in GCC Clause 2.1 above, shall remain the property of the Purchaser and shall be returned (in all copies) to the Purchaser, on completion of the Supplier's performance under the Contract, if so required by the Purchaser. | |
| **3.** | **Change Orders** | |
| | | |
| 3.1 | The Purchaser may at any time, by a written notice to the Supplier, make changes within the general scope of the Contract in any one or more of the following: | |
| | (a) | Decrease or increase in quantity within the delivery period. |
| | (b) | Drawings, designs or specifications, where Goods to be furnished under the Contract are to be specifically manufactured for the Purchaser; or |
| | (c) | The method of shipment or packing; or |
| | (d) | The place of delivery. |
| | (e) | The Related Services to be provided by the Supplier. |
| 3.2 | If any such change causes an increase or decreases in the cost of, or the time required for, the Supplier's performance of any provisions under the Contract, an equitable adjustment shall be made in the Contract Price or in the Delivery/Completion Schedule, or both, and the Contract shall accordingly be amended. Any claims by the Supplier for adjustment under this Clause must be asserted within Twenty-eight (28) days from date of the Supplier's receipt of the Purchaser's change order. | |
| 3.3 | Prices to be charged by the Supplier for any Related Services that might be needed but which were no included in the Contract shall be agreed upon in advance by the parties and shall not exceed the prevailing rates charged to other parties by the Supplier for similar services. | |
| 3.4 | The Supplier shall not perform changes in accordance with GCC Clause 3.1 above until the Purchaser has authorized a change order in writing on the basis of the estimate provided by the Supplier as described in GCC Clause 3.2 above. | |

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| 3.5 | Changes mutually agreed upon as a Change shall constitute a part of the work under this Contract, and the provisions and conditions of the Contract shall apply to the said change. |
| **4.** | **Contract Amendments** |
| 4.1 | Subject to Clause 3, no variation in or modification of the contract shall be made except by written amendment agreed and signed by the parties. |
| **5.** | **Subcontracting** |
| 5.1 | The Supplier shall not subcontractall or any part of the Contract without first obtainingthe Purchaser's approval in writing of the subcontracting. |
| 5.2 | The supplier guarantees that any and all subcontractors of the Supplier to performance of any part of the work under the Contract will comply fully with the terms of the Contract applicable to such part of the work under the Contract and shall not relieve the Supplier of any of its obligations, duties, responsibilities or liabilities under the Contract. |
| **6.** | **Country of Origin** |
| 6.1 | All Goods supplied under the Contract shall have their origin ineligible countries if these eligible countries are specified in the Special Conditions of Contract. For purposes of this Clause, "origin" shall be considered to be the place where the Goods were mined, grown or produced. Goods are produced when, through manufacturing, processing or substantial and major assembling of components, a commercially recognized new product results that is substantially different in basic characteristics or in purpose or utility form its components. |
| **7.** | **Inspection and Tests** |
| 7.1 | The Purchaser or its representative shall have the right to inspectand /or to test the Goods to confirm their conformity to the Specifications.<br>At its own expense and at no cost to the Purchaser, the Supplier shall carry out all such tests and/or inspections of the Goods and Related Services as specified in Section V, Schedule of Supply. The Purchaser shall notify the Supplier in writing of the identity of representatives nominated for these purposes. |
| 7.2 | The inspections and tests may be conducted on the premises of the Supplier or its subcontractor(s), at point of delivery, and/or at the Goods' final destination, or in a place in Bhutan as specified in SCC. Where conducted on the premises of the Supplier or its subcontractor(s), all reasonable facilities and assistance, including access to drawings and production data, shall be furnished to the inspectors at no charge to the Purchaser. The supplier shall also furnish copies of relevant reference IS documents or other relevant standards and test certificates for electrical equipment if specified in Section V, Schedule of Supply. |

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| 7.3 | As specified in SCC, whenever the Supplier is ready to carry out any such test and inspection, it shall give reasonable advance notice, including the place and time, to the Purchaser. The Supplier shall obtain from any relevant third party or manufacturer any necessary permission or consent to enable the Purchaser or it's designated representative to attend the test and/or inspection. |
| 7.4 | The Purchaser shall reject any Goods or any part thereof that fail to conform to the Specifications.The Supplier shall either rectify or replace such rejected Goods or parts thereof or make all alterations necessary to meet the Specifications at no cost to the Purchaser, and shall repeat the test and/or inspection, at no cost to the Purchaser, upon giving a notice pursuant to Clause 7.3 above. |
| 7.5 | The Purchaser's right to inspect, test and, where necessary, reject the Goods after the Goods' arrival in the Bhutan shall in no way be limited or waived by reason of the Goods' having previously been inspected, tested and passed by the Purchaser or its representatives prior to the Goods' shipment from the country of origin. |
| 7.6 | The Supplier shall ensure that all the materials are ready during the time of inspection. In case the materials are to be re-inspected due to reasons which are attributable to the supplier, the same shall be done at the cost of the supplier. |
| 7.7 | Nothing in this Clause 7 shall in any way release the Supplier from any Warranty or other obligations under the Contract. |
| **8. Packing and Documents** | |
| | |
| 8.1 | The Supplier shall provide such packing of the Goods as is required to prevent their damage or deterioration during transit to their final destination, as per the Contract. The packing shall be sufficient to withstand, without limitation, rough handling during transit and exposure to extreme temperatures, salt and precipitation during transit, and open storage. Packing case size and weights shall take into consideration, where appropriate, the remoteness of the Goods' final destination and the absence of heavy handling facilities at all points in transit. |
| 8.2 | The packing, marking, and documentation within and outside the packages shall comply strictly with such special requirements as shall be expressly provided for in the Contract, including additional requirements, if any, specified in Section V, Schedule of Supply and in any subsequent instructions ordered by the Purchaser. |
| **9. Delivery and Documents** | |
| | |
| 9.1 | Delivery of the Goods shall be made by the Supplier inaccordance with the Section V, Schedule of Supply. The details of shipping and/or other documents to be furnished by the Supplier are specified in the SCC. |
| 9.2 | Unless inconsistent with any provision of the Contract or otherwise specified in the SCC, the meaning of any trade term and the rights and obligations of parties thereunder shall be as prescribed by Incoterms. |

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| 9.3 | The terms EXW,CIP, CIF, DDP, and other trade terms used to describe the obligations of the parties shall be governed by the rules prescribed in the current edition of Incoterms specified in the SCC and published by the International Chamber of Commerce, Paris.. | |
| **10. Indemnity against infringement of Intellectual Property Rights** | | |
| | | |
| 10.1 | The Supplier shall, subject to the Purchaser's compliance with GCC Sub-Clause 10.2, indemnify and hold harmless the Purchaser and its employee(s) or representative(s) from and against any and all suits, actions or administrative proceedings, claims, demands, losses, damages, costs and expenses of any nature, including attorney's fees and expenses, which the Purchaser may suffer as a result of any infringement or alleged infringement of any patent, utility model, registered design, trademark, copyright or other intellectual property right registered or otherwise existing at the date of the Contract by reason of: | |
| | (a) | The installation of the Goods by the Supplier or the use of the Goods in Bhutan; and |
| | (b) | The sale in any country of the products produced by the Goods. |
| | Such indemnity shall not cover any use of the Goods or any part thereof other than for the purpose indicated by or reasonably to be inferred from the Contract, neither any infringement resulting from the use of the Goods or any part thereof, or any products produced thereby in association or combination with any other equipment, plant or materials not supplied by the Supplier, pursuant to the Contract. | |
| 10.2 | If any proceedings are brought or any claim is made against the Purchaser arising out of the matters referred to in GCC Sub-Clause 10.1, the Purchaser shall promptly give the Supplier notice thereof, and the Supplier may at its own expense conduct such proceedings or claim and any negotiations for the settlement of any such proceedings or claim. | |
| 10.3 | The Purchaser may, at the Supplier's request, afford all available assistance to the Supplier in conducting such proceedings or claim, and shall be reimbursed by the Supplier for all reasonable expenses incurred in so doing. | |
| 10.4 | The Purchaser shall indemnify and hold harmless the Supplier and its employees, officers and Subcontractors from and against any and all suits, actions or administrative proceedings, claims, demands, losses, damages, costs and expenses of any nature, including attorney's fees and expenses, which the Supplier may suffer as a result of any infringement or alleged infringement of any patent, utility model, registered design, trademark, copyright or other intellectual property right registered or otherwise existing at the date of the Contract arising out of or in connection with any design, data, drawing, specification or other documents or materials provided or designed by or on behalf of the Purchaser. | |
| **11. Performance Security** | | |
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| 11.1 | The Supplier shall within fifteen (15) working days of notification of contract | |

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| | award , provide Performance Security in the amount and currency specified in the SCC. | |
| 11.2 | The proceeds of the Performance Security shall be payable to the Purchaser as compensation from the Supplier's failure to complete its obligations under the Contract. The Performance Security is a security taken by the purchaser for due performance of the Contract and shall be forfeited if the Supplier fails without any legal excuse, to perform any promises that form the whole or part of a Contract or any agreement without need of establishing any loss incurred by the Purchaser.<br><br>The Supplier shall cause the validity period of the Performance Security to be extended for such period(s) as the contract performance may be extended pursuant to GCC Clause 16.2. | |
| 11.3 | The Performance Security shall be denominated in a currency (ies) of the Contract, or in a freely convertible currency acceptable to the Purchaser and shall be in one of the following forms: | |
| | (a) | Unconditional bank guarantee issued by a reputable financial institution acceptable to the Purchaser, in the form provided for in the Contract or in any other form acceptable to the Purchaser; or |
| | (b) | Banker's Cheque/Cash Warrant; or |
| | (c) | Demand Draft. |
| 11.4 | If the institution issuing the Performance Security furnished by the Bidder is located outside the Purchaser's country, the Performance Security shall be counter guaranteed by a correspondent financial institutions located in the Purchaser's country to make it enforceable. | |
| 11.5 | The Performance Security shall be discharged by the Purchaser and returned to the Supplier not later than thirty (30) days following the date of completion of the Supplier's performance obligations or any pending contractual issues arising under the Contract, or any warranty obligations, unless specified otherwise in the SCC. | |
| **12. Insurance** | | |
| | | |
| 12.1 | All Goods supplied under the Contract shall be fully insured in the currency of Contract against loss or damage incidental to manufacture or acquisition, transportation, storage and delivery, in accordance with the applicable Incoterms or in the manner specified in the SCC. | |
| **13. Warranty** | | |
| | | |
| 13.1 | The Supplier warrants to the Purchaser that the Goods supplied under the Contract will comply strictly with Contract and shall be free from defects arising from any act or omission of the Supplier or arising from design, materials, and workmanship under normal use in the conditions prevailing in the country of final destinations. | |
| 13.2 | Unless otherwise specified in the SCC, thewarranty shall remain valid for twelve (12) months after the Goods, or any portion thereof, as the case may be, have been | |

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| | delivered to and accepted at the final destination indicated in SCC. |
| 13.3 | The Purchaser shall notify the Supplier in writing stating the nature of any such defects together with all available evidence thereof, promptly following the discovery thereof. The Purchaser shall afford all reasonable opportunity for the Supplier to inspect such defects. |
| 13.4 | Upon receipt of such notice, the Supplier shall, within the period specified in the SCC repair or replace the defective Goods or parts thereof, at no cost to the Purchaser. |
| 13.5 | If the Supplier, having been notified, fails to remedy the defect(s) within the period specified in SCC, the Purchaser may proceed to take within a reasonable period such remedial action as may be necessary, at the Supplier's risk and expense and without prejudice to any other rights or remedies, which the Purchaser may have against the Supplier under the Contract. |
| **14. Payment** | |
| | |
| 14.1 | The method and conditions of payment to be made to the Supplier under the Contract shall be as specified in the SCC. |
| 14.2 | The Supplier's request(s) for payment shall be made to the Purchaser in writing accompanied by an invoice describing, as appropriate, the Goods delivered and services performed, and by documents submitted pursuant to GCC Clause 9 and upon fulfilment of other obligations stipulated in the Contract. |
| 14.3 | Payment shall be made by the Purchaser, but in no case later than 30 (thirty) days after submission of invoice or request for payment by the Supplier and the Purchaser has accepted it. |
| 14.4 | The currency or currencies in which payment is made to the Supplier under the Contract will be made in the currency or currencies specified in SCC. |
| **15. Contract Prices** | |
| | |
| 15.1 | The Contract Price shall be as specified in the Contract Agreement subject to any additions and adjustments thereto or deductions therefrom as may be made pursuant to the Contract. |
| 15.2 | Prices charged by the Supplier for Goods delivered and Services performed under the Contract shall not vary from the prices quoted by the Supplier in its bid, which the exception of any change in price resulting from a Change Order issued in accordance with GCC Clause 3, or if applicable, adjustments authorized in accordance with the price adjustment provisions specified in the SCC. |
| **16. Contract Execution Schedule and Extensions in the Supplier's Performance** | |
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| 16.1 | Delivery of the Goods shall be made by the Supplier in accordance with the |

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| | Contract Execution Schedule, pursuant toSCC. | |
| 16.2 | The Supplier may claim extension of the time limits as set forth in the Contract Execution Schedule in case of: | |
| | (a) | Change in the Goods ordered by the Purchaser pursuant to GCC Clause 3; |
| | (b) | Delay of any materials, drawings or services, which are to be provided by the Purchaser; services provided by the Purchaser shall be interpreted to include all approvals by the Purchaser under the Contract; |
| | (c) | Force Majeure pursuant to GCC Clause 23; and |
| | (d) | Delay in performance of work caused by change order or amendment(s) issued by the Purchaser. |
| 16.3 | The Supplier shall demonstrate to the Purchaser's satisfaction that it has used its best endeavours or overcome such causes for delay, and the parties will mutually agree upon remedies to mitigate or overcome such causes for delay. | |
| 16.4 | Notwithstanding GCC Clause 16.2 above, the Supplier shall not be entitled to an extension of time for completion unless the Supplier, at the time of such circumstances arising, has notified the Purchaser in writing within 10 (Ten) days of any delay that it may claim as caused by circumstances pursuant to GCC Clause 16.2 above; and upon request of the Purchaser, the Supplier shall substantiate that the delay is due to the circumstances referred to by the Supplier. | |
| **17. Liquidated Damages** | | |
| | | |
| 17.1 | Subject to GCC Clause 16, if the Supplier fails to deliver any or all of the Goods or to perform the Services within the period(s) specified in the Contract, the Purchaser may without prejudice to its other remedies under the Contract, deduct from the Contract Price, as liquidated damages, a sum equivalent to the percentage specified in the SCC of the delivered price of the delayed goods or unperformed services for each week or part thereof of delay until actual delivery or performance, up to a maximum deduction of the percentage specified in the SCC. Once the maximum is reached, the Purchaser may consider termination of the Contract pursuant to GCC Clause 18, Termination for Default. | |
| **18. Termination for Default** | | |
| | | |
| 18.1 | The Purchaser may, without prejudice to any other remedy for breach of Contract, by written notice of default sent to the Supplier, terminate the Contract in whole or in part: | |
| | (a) | If the Supplier fails to deliver any or all of the Goods within the Contract delivery period(s) specified in the Contract, or any extension thereof granted by the Purchaser, pursuant to GCC Clause 16 without the need of waiting |

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| | | maximum deduction of percentage specified in GCC Clause 17.1 after serving 10 (ten) days notice in writing; or |
| | (b) | If the Supplier, in either of the above circumstances, does not cure its failure within a period of 10 (ten) days (or such longer period as the Purchaser may authorize in writing) after receipt of a notice of default from the Purchaser specifying the nature of the default(s); and |
| | (c) | If the supplier fails to perform any other obligation(s) under the Contract. |
| 18.2 | Subject to Clause 18.1 above, when the Contract is terminated for default, the Purchaser shall forfeit the Performance Security and deduct from the contract price, as liquidated damages, a sum equivalent to the percentage specified in the SCC of the delayed delivered price of the goods accepted by the Purchaser. | |
| **19.** | **Termination for insolvency** | |
| | | |
| 19.1 | The Purchaser may at any time terminate the Contract by givingwritten notice to the Supplier, without compensation to the Supplier, if the Supplier becomes bankrupt or otherwise insolvent. Notwithstanding the above, such termination will not prejudice or affect any right of action or remedy, which has accrued or will accrue thereafter to the Purchaser. | |
| **20.** | **Termination for Convenience** | |
| | | |
| 20.1 | The Purchaser may, by written notice sent to the Supplier,terminate the Contract, in whole or in part, at any time for its convenience. The notice of termination shall specify that termination is for the Purchaser's convenience, the extent to which performance of work under the Contract is terminated, and the date upon which such termination becomes effective. | |
| 20.2 | The Goods that are complete and ready for shipment within 30 (thirty) days after the Supplier's receipt of notice of termination shall be purchased by the Purchaser at the Contract prices and on the other Contract terms. For the remaining Goods, the Purchaser may elect: | |
| | (a) | To have any portion thereof completed and delivered at the contract prices and as per the Contract terms; and/or |
| | (b) | To cancel the remainder and pay to the Supplier an agreed amount for partially completed Goods and for materials and part previously procured by the Supplier. |
| **21.** | **Resolution of Disputes** | |
| | | |
| 21.1 | The Purchaser and the Supplier shall make every effort to resolve amicably by direct informal negotiation anydisagreement or dispute arising between them under or in connection with the Contract. | |
| 21.2 | If, after 30 (thirty) days from the commencement of such informal negotiations, the Purchaser and the Supplier have been unable to resolve amicably a Contract dispute, | |

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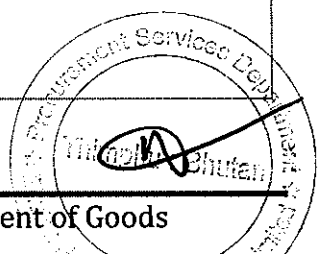
| | either party may require that the dispute be referred for resolution by arbitration as described in Clause 21.3. |
| 21.3 | If the dispute is to be settled by arbitration, the Purchaser and the Supplier shall be entitled to appoint one member each, and third arbitrator will be appointed by both of them by mutual consent. If either the Purchaser or the Supplier fails to appoint a representative, or both of them cannot agree on the appointment of a third member within thirty (30) days from the date of agreement to refer the matter for arbitration, then the case will be referred to the proper court in Bhutan for adjudication. The award shall be final and binding on the parties if not appealed within 10 (Ten) working days. If the disputes are settled by Arbitration, the cost of Arbitration shall be borne by both parties equally. |
| 21.4 | The arbitrations proceedings shall be conducted in accordance with the rules of procedures specified in SCC. |
| **22.** | **Applicable Law** |
| | |
| 22.1 | The Contract shall be governed by and interpreted in accordance with the laws of the Bhutan. |
| **23.** | **Force Majeure** |
| | |
| 23.1 | The Supplier shall not be liable for forfeiture of its Performance Security, liquidated damages or termination for default if and to the extent that it's delay in performance or other failure to perform its obligations under the Contract is the result of an event of Force Majeure.Such delay may be excused as provided in GCC Clause 16, and the period of such delay may be added to the time of performance of the obligation delayed. |
| 23.2 | For purposes of this Clause, "Force Majeure" means an event or situation beyond the control of the Supplier that is not foreseeable, unavoidable, and its origin is not due to negligence or lack of care or other malfeasance on the part of the Supplier. Such events may include, but not be limited to, acts of the Purchaser in its sovereign capacity, wars or revolutions, fires, floods, epidemics, quarantine restrictions, strikes, riot, and freight embargoes. |
| 23.2 | If a Force Majeure situation arises, the Supplier shall notify the Purchaser in writing of such condition and the cause thereofwithin 10 (ten) days. Unless otherwise directed by the Purchaser in writing, the Supplier shall continue to perform its obligations under the Contract as far as is reasonably practical, and shall seek all reasonable alternative means for performance not prevented by the Force Majeure event. |
| **24.** | **Assignment** |
| | |
| 24.1 | The Supplier shall not assign, in whole or in part, its obligations to perform under the Contract, except with the Purchaser's prior written consent. |



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| **25.** | **Contract Language** | |
| | | |
| 25.1 | The Contract, as well as all correspondence and documents relating to the Contract exchanged by the Supplier and the Purchaser, shall be written in the language specified in the SCC. Supporting documents and printed literature that are part of the Contract may be in another language provided they are accompanied by an accurate translation of the relevant passages in the language specified in the SCC, in which case, for purposes of interpretation of the Contract, the translation shall govern. | |
| 25.2 | The Supplier shall bear all costs of translation to the governing language and all risks of theaccuracy of such translation, for documents provided by the Supplier. | |
| **26.** | **Taxes and Duties** | |
| | | |
| 26.1 | The Supplier shall bear and pay all applicable taxes, stamp duties, license fees and other similar levies imposed both outside and inside Bhutan, as specified in SCC. | |
| **27.** | **Waiver** | |
| | | |
| 27.1 | Failure of either party to insist upon strict performance by the other party of any provision of the Contract shall in no way be deemed or construed to effect in any way the right of that party to require such performance. | |
| **28.** | **Limitation of Liability** | |
| | | |
| 28.1 | Except in cases of gross negligence or willful misconduct: | |
| | (a) | Neither party shall be liable to the other party, whether in contract, tort or otherwise, for any indirect or consequential loss or damage, loss of use, loss of production, or loss of profits or interest costs, provided that this exclusion shall not apply to any obligation of the Supplier to pay liquidated damages to the Purchaser; and |
| | (b) | The aggregate liability of the Supplier to the Purchaser, whether under the Contract, in tort or otherwise, shall not exceed the total Contract Price, provided that this limitation shall not apply to the cost of repairing or replacing defective equipment, or to any obligation of the Supplier to indemnify the Purchaser with respect to patent infringement. |
| **29.** | **Export Restriction** | |
| | | |
| 29.1 | Notwithstanding any obligation under the Contract to complete all export formalities, any export restrictions attributable to the Purchaser, to Bhutan, or to the use of the products/Goods, systems or services to be supplied, which arise from trade regulations from a country supplying those products/Goods, systems or services, and which substantially impede the Supplier from meeting its obligations under the Contract, shall release the Supplier from the obligation to provide deliveries or services, always provided, however, that the Supplier can demonstrate to the satisfaction of the Purchaser that it has completed all formalities in a timely manner, including applying for permits, authorizations and licenses necessary for the export of | |

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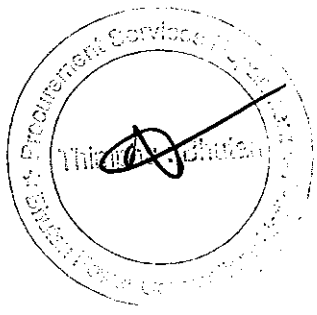
| | the products/Goods, systems or services under the terms of the Contract. Termination of the Contract on this basis shall be for the Purchaser's convenience pursuant to Clause 20. |



**Section VII. Special Conditions of Contract**

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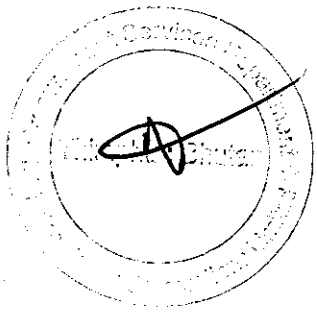

## Section VII. Special Conditions of Contract (SCC)

The following Special Conditions of Contract (SCC) shall supplement the General Conditions of Contract (GCC). Whenever there is a conflict, the provisions herein shall prevail over those in the General Conditions of Contract (GCC).

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| **1. Definitions** | |
| GCC 1.1 (f) | The Purchaser is: *Procurement Services Department, Bhutan Power Corporation Limited, Yarden Lam, Post Box No. 580, Thimphu, Bhutan.*<br><br>The consignee is:<br>*The Manager, Regional Store Division, Regional Stores Division, Bhutan Power Corporation Limited, Phuentsholing, Bhutan.* |
| **2. Inspection and Test** | |
| GCC 7.1 | The inspections and tests shall be: *Applicable* |
| GCC 7.2 | Inspections and tests shall be conducted at: *Manufacturer's premises.* |
| GCC 7.3 | All materials shall be inspected and tested as specified in the relevant IEC or BS or IS standards. The supplier must notify the purchaser in writing (and by fax to be confirmed with a mailed copy) within twenty (20) days in advance once the goods are ready for dispatch. This should be notified to purchaser at the following address:<br><br>Attention: *The General Manager*<br><br>Address: *Procurement Services Department*<br>*Bhutan Power Corporation Limited*<br>*Thimphu: Bhutan*<br><br>Telephone: *00975-2-336046/325095, Extn: 490*<br><br>E-mail address: *nim.dorji@bpc.bt* *Copy to : tsheringchoden16@bpc.bt*<br><br>The period indicated is for deputing an inspector and has no connection with the stipulated delivery schedule. If the delay in the delivery of all or part of materials has been caused due to delay beyond the maximum allowable period in nominating inspectors by the purchaser after the inspection call has been received in writing by the purchaser, the delivery period shall be extended by the period equivalent to such delay in sending inspectors by the purchaser for the whole or part of the materials. |
| GCC 7.5 | To ensure that the goods are delivered in good condition, suppliers/supplier's representatives need to be present for the joint inspection of the goods at the BPC warehouse and sign the joint inspection report. |
| **3. Packing and Documents** | |
| GCC 8.2 | The supplier shall pack all the Goods as is required to prevent damage or |

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| | deterioration in transit to the final destination. The packing should be sufficient to withstand rough handling and exposure to extreme temperatures, salt and precipitation during transit and/or storage as per GCC Clause 8. |
| **4. Delivery and Documents** | |
| GCC 9.1 | a. The good need to be delivered at the designated place as specified in Section V, Schedule of Supply. Further, the shipment should be completed within 21 (twenty one) days after inspection/dispatch clearance if the delivery is made from India and within 60 (sixty) days if the delivery is made from Third countries. However, the overall schedule for delivery of the material at the place of delivery as per contract stipulations shall be met and any delay in meeting the schedule will be dealt with as per contract stipulation including but not limited to Liquidated Damages.<br><br>b. Details of Shipping and other Documents to be furnished by the Supplier after the delivery of goods are:<br><br>*(i) Copies of the Supplier's invoice showing Goods description, quantity, unit price, and total amount;*<br>*(ii) Suppliers Good Issues Note (Challan);*<br>*(iii) Copy of import declaration form (B-Form)in Bhutan;*<br>*(iv) Original tax paid receipt in Bhutan.*<br>*(v) Manufacturer's or Supplier's warranty certificate;*<br>*(vi) Packing List;*<br>*(vii) Inspection report/Test Certificate;* |
| GCC 9.2 | The meaning of the trade terms shall be as prescribed by Incoterms 2010, read in conjunction with any specific explanation of the tender. |
| GCC 9.3 | The version of Incoterms shall be: *2010,* read in conjunction with any specific explanation of the tender. |
| **5. Performance Security** | |
| GCC 11.1 | The amount of Performance Security shall be: *10% of the contract value.* |
| GCC 11.5 | Discharge of Performance Security shall take place: *As indicated in GCC Sub-Clause 11.5* |
| **6. Insurance** | |
| GCC 12.1 | The insurance coverage shall be as specified in the Incoterms 2010. |
| **7. Warranty** | |
| GCC 13.2 | The period of validity of the Warranty shall be: *Twelve (12) months from the date of acceptance of goods at the place of destination, Regional Store Division, Pasakha/Malbase, PSD, BPC, Phuentsholing, Bhutan.*<br><br>*As a proof of performance warranty, the supplier have to deposit 10% of the supplied value in the form of Bank Guarantee acceptable to the Purchaser which shall be valid for a period not less than twelve (12) months after delivery of last consignment.*<br><br>*Or*<br><br>*As a proof of performance warranty, the purchaser will not release the 10%* |

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| | *retention money to cover the defects liability period which shall be minimum of twelve months after the delivery of the last consignment. However, the payment for the retention amount shall be made provided the Supplier presents request for payment accompanied by a Retention Security in the form of Bank Guarantee issued by a reputable financial institution acceptable to the purchaser for an amount equal to the amount of retention payment and the validity of the Bank Guarantee shall be not less than twelve (12) months after the delivery of last consignment.*<br><br>*If the Financial institution issuing the performance warranty bank guarantee/retention security bank guarantee furnished by the Bidder is located outside the Purchaser's country, the bank guarantee shall be counter guaranteed by a correspondent financial institution located in the Purchaser's country to make it enforceable.* |
| **8. Payment** | |
| GCC 14.1 | Payments shall be made in equivalent Ngultrum to the currency quoted amount but the payment shall be made through proper banking channels and the responsibilities of payment transfer and transfer charges lie on the Suppliers.<br><br>Undertaking letter from routing of payment through the Banks (if the payment is not through Letter of Credit) shall not be issued.<br><br>a. Advance Payment: Maximum of ten percent (10%) of the Contract Price as advance payment shall be paid after the signing of the Contract. Payment shall be made provided the Supplier presents a request for payment accompanied by an Advance Payment Security in the form of Bank Guarantee issued by a reputable financial institution acceptable to the purchaser for an amount equal to the amount of the advance payment, and shall be valid until the goods are delivered.<br><br>b. On Acceptance: Eighty percent (80%) of the Contract Price of the goods received shall be paid within Thirty (30) days of receipt of the goods upon the submission of a claim supported by the Acceptance Certificate issued by the Purchaser.<br><br>c. Retention Payment: Ten percent (10%) of the Contract Price will be payable after the expiry of defects liability period (for a period not exceeding twelve months after the delivery of all materials). However, payment shall be made provided the Supplier presents a request for payment accompanied by a Retention Security in the form of Bank Guarantee issued by a reputable financial institution acceptable to the purchaser for an amount equal to the amount of retention payment and shall be valid for a period not less than twelve (12) months after delivery of all materials.<br><br>If the Financial institution issuing the advance payment bank guarantee/retention security bank guarantee furnished by the Bidder is located outside the Purchaser's country, the bank guarantee shall be counter guaranteed by a correspondent financial institution located in the Purchaser's country to make it enforceable. |

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| **9. Contract Prices** | |
| GCC 15.2 | The prices charged for the Goods supplied and the related Services performed *shall not* be adjustable. |
| **10. Contract Execution Schedule and Extension in the Supplier's Performance** | |
| GCC 16.1 | The contract shall be executed as per Contract Execution Schedule given below:<br>*a) The commencement of the contract period shall be assumed from the date of signing of the contract agreement if an agreement is executed; otherwise the notification of award is an acceptance and shall constitute a contract between the parties.* |

| *Days* | *Activity* | *Remarks* |
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*b) The Supplier shall be responsible for supplying three (3) copies of correct drawings to BPC for approval in the template provided in Section V, Schedule of Supply. Any errors or omission shall be to the Suppliers account and delays caused due to the need to rectify unclear/unacceptable drawings shall not be justification for time extension. BPC will take fifteen (15) working days for the drawing approval from the receipt date.*

*c) The Supplier shall submit a detailed program covering the manufacturing, testing and delivery of the materials and equipment within the time stated in the bid documents. The program shall be in the form of bar chart. The Supplier shall submit progress reports detailing progress and explaining any variations if any.*

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| **11. Liquidated Damages** | |
| GCC 17.1 | The liquidated damages shall be: *1 % per week.* |
| GCC 17.1 | The maximum amount of liquidated damages shall be: *10 % of the contract value.* |
| **12. Resolution of Disputes** | |
| GCC 21.2 | The rules of procedure for arbitration proceedings pursuant to GCC Sub-Clause 21.2 shall be as per the Alternative Dispute Resolution Act of Bhutan 2013. |
| **13. Taxes and Duties** | |
| GCC 26.1 | Pursuant to GCC 26.1<br>a. Price quoted shall be inclusive of all taxes (both inside and outside the purchaser's country) and Purchaser shall not be responsible and liable for the reimbursement/payment of taxes and duties. Further, for the clarity of applicable taxes, the Bidders may check with Department of Revenue and Custom, Ministry of Finance, Thimphu Bhutan / for exact Tax Rates in Bhutan for goods offered from India/Third Countries that are payable in Bhutan;<br>b. The manufacturer(s) in Bhutan are to pay the taxes in accordance with the rules |

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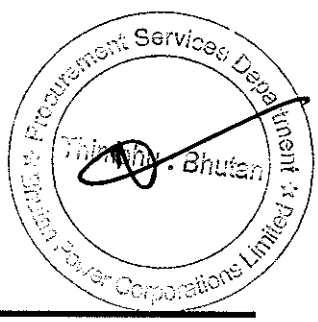
| | of the Government without any liability to the Purchaser. Purchaser shall not be responsible for reimbursement/processing exemptions/payments of taxes, duties, levies, royalties etc. for raw materials; and<br><br>c. Tax Deducted at Source (TDS) shall be deducted as per the regulations of Ministry of Finance, RGoB, Bhutan. |



**Section VIII. Contract Forms**

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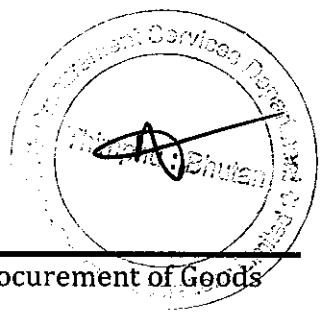

## Contract Agreement

THIS CONTRACT AGREEMENT made on the _____ [*insert number*] day of_____ [*insert month*], [*insert year*],

BETWEEN

_____[insert complete n*ame of Purchaser]*of Bhutan Power Corporation and having its principal place of business at _____ *[insert address of Purchaser* (hereinafter "the Purchaser") of the one part and

_____[insert n*ame of Supplier], a corporation incorporated under the laws of* _____ *[insert: country of Supplier] and having its principal place of business at* _____*[insert address of Supplier]*(hereinafter "the Supplier") of the other part.

WHEREAS the Purchaser is desirous that certain goods be provided by the Supplier, viz.,

_____
*[insert Brief Description of Goods, as identified in the Bid Form and Price Schedule]*(hereinafter "the Goods") and has accepted a Bid by the Supplier for the provision of those Goods in the sum of _____[*insert Contract Price in Words and Figures)*(hereinafter "the Contract Price").

NOW THIS CONTRACT AGREEMENT WITNESSETH AS FOLLOWS:

1. In this Agreement words and expression shall have the same meaning as are respectively assigned to them in the Conditions of Contract referred to.

2. The following documents shall constitute the Contract between the Purchaser and the Supplier, and each shall be read and construed as an integral part of the Contract:

   a) This Contract Agreement;
   b) Minutes of Contract Negotiation Meeting;
   c) Special Conditions of Contract;
   d) General Conditions of Contract;
   e) Technical Requirements;
   f) The Supplier's Bid and original Price Schedule;
   g) The Purchaser's Notification of Award;
   h) Integrity Pact;
   i) VPMS Acceptance Form

3. This Contract shall prevail over all other Contract documents. In the event of any discrepancy or inconsistency within the Contract documents, then the documents shall prevail in the order listed above.

4. In consideration of the payments to be made by the Purchaser to the Supplier as hereinafter mentioned, the Supplier hereby covenants with the Purchaser to provide the Goods and to remedy defects therein in conformity in all respects with the provisions of the Contract.

5. The Purchaser hereby covenants to pay the Supplier, in consideration of the provision of the Goods and the remedying of defects therein, 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.

IN WITNESS WHEREOF, the parties hereto have caused this Contract Agreement to be executed in accordance with the laws of Bhutan on the day, month and year indicated above

For and on behalf of the Purchaser:

Signed: _____ *[insert signature]*

In the capacity of _____*[insert title or other appropriate designation*]

In the presence of _____ *[insert signature]*

_____*[insert identification of official witness]*

For and on behalf of the Supplier

Signed: _____ *[insert signature of authorized representative(s) of the Supplier]*

In the capacity of_____*[insert title or other appropriate designation]*

In the presence of_____ *[insert signature]*

_____*[insert identification of official witness]*

## Performance Security

*[The bank, as requested by the successful Bidder, shall fill in this form in accordance with the instructions indicated]*

Date:_____ *[insert date (as day, month, and year) of Bid submission]*
IFB No. and title:_____ *[insert no. and title of bidding process]*

Bank's Branch or Office:_____ *[insert complete name of Guarantor]*

**Beneficiary:** _____*[insert complete name of Purchaser]*

**PERFORMANCE GUARANTEE No.:** _____
*[insert Performance Guarantee number]*

We have been informed that _____ *[insert complete name of Supplier]* (hereinafter called "the Supplier") has entered into Contract No._____ *[insert number]* dated _____*[insert day and month], [insert year]* with you, for the supply of _____ *[description of Goods and related Services]* (hereinafter called "the Contract").

Furthermore, we understand that, according to the conditions of the Contract, a Performance Guarantee is required.

At the request of the Supplier, we hereby irrevocably undertake to pay you any sum(s) not exceeding _____*[insert amount(s)[1] in figures and words]* upon receipt by us of your first demand in writing declaring the Supplier to be in default under the Contract, without cavil or argument, or you needing to prove or to show grounds or reasons for your demand or the sum specified therein.

This Guarantee shall expire no later than the_____*[insert number]* day of _____*[insert month] [insert year]*,[2] and any demand for payment under it must be received by us at this office on or before that date. We agree to a one-time extension of this Guarantee for a period not to exceed *[six months] [one year]*, in response to the Purchaser's written request for such extension, such request to be presented to us before the expiry of the Guarantee.

_____
*[Signatures of authorized representatives of the bank]*

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1 *The Bank shall insert the amount(s) specified in the SCC and denominated, as specified in the SCC, either in the currency(ies) of the Contract or a freely convertible currency acceptable to the Purchaser.*

2 *Date established in accordance with General Conditions of Contract ("GCC"). The Purchaser should note that in the event of an extension of the time to perform the Contract, the Purchaser would need to request an extension of this Guarantee from the Bank. Such request must be in writing and must be made prior to the expiration date established in the Guarantee.*

## Bank Guarantee for Advance Payment

*[The bank, as requested by the successful Bidder, shall fill in this form in accordance with the instructions indicated.]*

Date:_____ *[insert date (as day, month, and year) of Bid submission]*
IFB No. and title: _____*[insert number and title of bidding process]*

*[bank's letterhead]*

**Beneficiary:**_____*[insert legal name and address of Purchaser]*

**ADVANCE PAYMENT GUARANTEE No.:** _____
*[insert Advance Payment Guarantee no.]*

We, _____ *[insert legal name and address of bank],* have been informed that_____ *[insert complete name and address of Supplier]* (hereinafter called "the Supplier") has entered into Contract No. _____*[insert number]* dated_____ *[insert date of Contract]* with you, for the supply of _____ *[insert types of Goods to be delivered]* (hereinafter called "the Contract").

Furthermore, we understand that, according to the conditions of the Contract, an advance payment is to be made against an advance payment guarantee.

At the request of the Supplier, we hereby irrevocably undertake to pay you any sum or sums not exceeding in total an amount of _____ *[insert amount(s)[3] in figures and words]* upon receipt by us of your first demand in writing declaring that the Supplier is in breach of its obligation under the Contract because the Supplier used the advance payment for purposes other than toward delivery of the Goods.

It is a condition for any claim and payment under this Guarantee to be made that the advance payment referred to above must have been received by the Supplier in its account _____ *[insert number and domicile of the account]*

This Guarantee shall remain valid and in full effect from the date of the advance payment received by the Supplier under the Contract until _____ *[insert date[4]].* We agree to a one-time extension of this Guarantee for a period not to exceed_____ *[six months][one year]*, in response to the Purchaser's written request for such extension, such request to be presented to us before the expiry of the Guarantee.

_____
*[signature(s) of authorized representative(s) of the bank]*

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[3] *The bank shall insert the amount(s) specified in the SCC and denominated, as specified in the SCC, either in the currency(ies) of the Contract or a freely convertible currency acceptable to the Purchaser.*

[4] *Insert the Delivery date stipulated in the Contract Delivery Schedule. The Purchaser should note that in the event of an extension of the time to perform the Contract, the Purchaser would need to request an extension of this Guarantee from the bank. Such request must be in writing and must be made prior to the expiration date established in the Guarantee*