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## Section 1A – Instruction to Bidders

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## SECTION 1

### INSTRUCTION TO BIDDERS

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## **PART – 1**

### **SECTION 1 - INSTRUCTION TO BIDDERS**

#### **A. GENERAL**

1. **Scope of Bid**
  - 1.1 Bhutan Power Corporation Limited (BPC), Distribution and Customer Services Department (hereinafter referred to as the Employer), invites sealed bid for improvement and upgradation of Samdrup Jongkhar Town-Phase I.
    - (a) Engineering, manufacture, testing at works, supply and delivery, handling, storage, erection, testing and commissioning of the Medium Voltage (MV) underground (UG) network, Low Voltage (LV) UG, Service connection to complete the works in all respects. Erection testing and commissioning of packaged substation.
    - (b) Civil works involving site grading, excavation, levelling and finishing foundations for equipment, structures, cable trenches, fence and gates, as per the bill of quantities. (hereinafter referred to as the Works).
    - (c) The overall scope of works are MV UG cable supply and laying -1.5 kms, LV UG cable supply and laying – 6.5 kms, service connection for 138 buildings, erection, testing and commissioning of packaged substation (5 nos).
    - (d) Erection, testing and commissioning of 5 numbers of unitized substation.
    - (e) All the works that are required for proper functioning of the system and complete in all respect in order to supply power.
  - 1.2 Bidders shall adhere to all the statutory regulations of Royal Government of Bhutan while undertaking the works.
  - 1.3 The Successful bidder will be expected to complete the Works within 18 (eighteen) months from the date of handing over of the site.

2. **Eligible Bidders**
- 2.1 This Invitation to Bid is open to registered and eligible Class B and above electrical contractors who have experience in the works of similar nature, who fulfill the Qualification requirements given in Clause 4 and meet the following requirements :
- A bidder (including all members of a joint venture and all sub-contractors of a bidder) shall not be affiliated with a firm or entity
- a) which has provided consulting services to the Employer during the preparatory stages of the Works or of the project of which the Works form a part, or
  - b) which has been hired (or is proposed to be hired) by the Employer as Engineer for the Contract.
- 2.2 Bidders shall provide such evidence of their eligibility satisfactory to the Employer as the Employer shall reasonably request.
3. **Origin of Materials, Equipment and Services**
- 3.1 "Origin" means the place where the materials and equipment are mined, grown, produced or manufactured, and from which the services are provided. Materials and equipment are produced when, through manufacturing, processing or substantial or major assembling of components, a commercially recognized product results that is substantially different in basic characteristics or in purpose or utility from its components.
4. **Qualification of the Bidder**
- 4.1 To be qualified for award of Contract, bidders shall:
- a) submit a written power of attorney authorising the signatory of the bid to commit the bidder; and
  - b) submit satisfactory evidence concerning the following:
    - i. The bidder is a qualified manufacturer/erector/ or an authorised representative of a qualified manufacturer/erector who regularly manufactures/erects the equipment/ materials of the type quoted and has adequate technical knowledge and practical experience.
    - ii. The bidder has adequate financial capability to meet the financial obligations pursuant to the scope of the works (submit three (3) copies of profit and loss account for the past five (5)

- years).
- iii. The bidder does not anticipate change in ownership during the proposed period of work (if such a change is anticipated, the scope and effect thereof shall be defined).
  - iv. Bhutanese bidders, who wish to participate in the tender either by themselves or as a partner of any Joint Venture, shall furnish a copy of the Valid Business License, Construction Development Board (CDB) registration certificate and Tax Clearance Certificate (TCC) issued by competent authorities. With regard to submission of Tax Clearance Certificate, this clause is equally applicable to other taxpaying non-Bhutanese firms working in Bhutan.
  - v. The bidder has adequate equipment, plant and manufacturing capacity to execute the works within the time specified. The evidence shall consist of written details of the installed manufacturing capacities and present commitments (excluding the work under this specification) of the bidder or his principal. If the present commitments are such that the installed capacity results in inadequacy of the manufacturing capacity to meet the requirement of equipment/materials corresponding to this bid then the details of alternative arrangements made shall also be furnished.
  - vi. The bidder has adequate field service organisation to provide the necessary field erection and management services required to successfully erect, test and commission the equipment/ materials as required under the specifications.
  - vii. The bidder has established Quality Assurance System and Design Organisation to achieve high level of equipment/ material reliability during manufacture and installation.
  - viii. The bidder should provide details of any current litigation that he is involved with.

4.2 Bids submitted by a joint venture of two or more firms as partners shall comply with the following requirements :

- a) the bid, and in case of a successful bid, the Form of Agreement, shall be signed so as to be legally binding on all partners;

- b) one of the partners shall be authorised to be in charge; and this authorisation shall be evidenced by submitting a power of attorney signed by legally authorised signatories of all the partners;
- c) the partner in charge shall be authorised to incur liabilities and receive instructions for and on behalf of any or all partners of the joint venture and the entire execution of the Contract including payment shall be done exclusively with the partner in charge.
- d) all partners of the joint venture shall be jointly and severally liable for the execution of the Contract in accordance with the Contract terms, and a relevant statement to this effect shall be included in the authorisation mentioned under b) above as well as in the Bid Form and the Form of Agreement (in case of successful bid); and
- e) the joint venture, through which the local Contractors intend to bid, shall have a lead firm and a copy of the agreement entered into by the joint venture partners shall be submitted with the bid.
- f) The Partner of the Joint Venture shall necessarily be a firm. The Bhutanese Partner need not be a firm but has to be a Class B and above Electrical contractor and well experienced Contractor with good track record and listed as competent contractor with Bhutan Power Corporation. A local (Bhutanese) firm can associate with at the most two independent Indian Bidders.
- g) The combined experience of the all the Joint venture partners will be considered for the eligibility for the technical, financial and experience specified in clause 4.1 and 4.5. The bidders in Technical bid shall also enclose the letters from the manufacturers confirming that they would supply the equipment in case of award of the contact.
- h) The JV agreement shall include i) Joint and Several liability of all the JV partner and ii) Scope of JV partner.

4.3 Bidders shall also submit proposals of work methods and schedule, in sufficient detail to demonstrate the adequacy of the bidders' proposals

to meet the technical specifications and the completion time referred to in Sub-Clause 1.3 above.

4.4 Qualification will also be based on meeting all the following minimum criteria regarding the Bidder's general and particular experience, personnel and equipment capabilities and financial position as demonstrated by the Bidder's responses in the corresponding schedules to the Bid. The Employer reserves the right to waive minor deviations if they do not materially affect the capability of a Bidder to perform the Contract.

4.5 Experience of the Contractor/ Bidder

The Bidder shall meet the following minimum qualification criteria:

A minimum qualifying requirement is that the Bidder should have successfully carried out, as a prime contractor, the execution of at least two projects of similar nature and complexity comparable to the proposed project during the last ten years. This experience should include the following:

a) Technical

- i. The bidder has carried out similar works.
- ii. The bidder has adequate personnel (electrical and civil engineer) in their pay roll.

b) Financial

- i. The bidder should have an average annual turnover (defined as billing for works in progress and completed) over last five years of Nu. 5 million.
- ii. The Bidder should also demonstrate that he has access to, or available, liquid assets unencumbered real assets, line of credit and other financial means (inter alia including a Guarantee or an undertaking from a Bank or Financier) sufficient to meet the construction cash flow for a period of three months,

estimated as Nu. 3 million or equivalent; net of the Bidder's commitments for other contract.

The audited balance sheets for the last five years should be submitted and must demonstrate the soundness of the Bidder's position, showing long term profitability. Where necessary the Employer will make inquiries with the Bidder's bankers.

The Bidder shall fill the above information in Schedules given in the bid document.

Qualification of Associate Contractors/  
Manufacturers

- 4.6 A list of approved manufacturers whose product is only to be supplied is enclosed in Part 2 of Volume I. In case of unavailability of the any make, it shall be clearly brought out in the technical bids. The Employer may approve alternate supplier in case of closure/ merger of the specified make.
- 5 **One Bid per Bidder** 5.1 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 other than alternatives pursuant to Sub-Clause 17.1 will be disqualified.
6. **Cost of Bidding** 6.1 The bidder shall bear all costs associated with the preparation and submission of its bid and the Employer will in no case be responsible or liable for those costs.
7. **Site Visit** 7.1 The bidder is advised to visit and examine the Site of Works and its surroundings and obtain for itself on its own responsibility all information that may be necessary for preparing the bid and entering into a contract for the Works. The costs of visiting the Site shall be at the bidder's own expense and at his own risk. The Electricity Services Division will show the site to the interested bidders.
- 7.2 The bidder and any of its personnel or agents will be granted permission by the Employer to enter upon its premises and land for the purpose of such inspection, but only upon the express condition that the bidder, its personnel and agents, will release and indemnify the Employer and its personnel and agents from and against all liability in respect

thereof and will be responsible for death or personal injury, loss of or damage to property and any other loss, damage, costs and expenses incurred as a result of the inspection.

## **B. BIDDING DOCUMENTS**

### **8. Content of Bidding Documents**

8.1 The bidding documents are those stated below, and should be read in conjunction with any Addenda issued in accordance with Clause 10.

#### **Volume I**

##### **PART - 1**

Invitation for Bids

- 1A Instructions to Bidders  
General Conditions of Contract
- 1B (FIDIC – E & M Works Third Edition  
1987)  
Reprinted with further amendments in  
1992.
- 1C Conditions of Particular Application

##### **PART- 2**

- 2A Technical requirements –General
- 2B Technical specifications (Electrical)
- 2C Technical specifications (Civil)
- 2D Installation, testing and commissioning
- 2E Drawings, test certificates and O & M  
manuals
- 2F Contractor’s safety program
- 2G List of approved makes
- 2H Bid purpose drawings

#### **Volume II**

##### **PART – 1**

- 3A Forms and Technical information,  
Forms of Bid and Bid Security,  
Form of Agreement,  
Forms of Performance Bank Guarantee  
and Bank Guarantee for Advance  
Payment.  
Integrity Pact
- 3B Schedules of Supplementary Information  
containing Schedules – Guaranteed

Technical Particulars should be submitted in the form of Electronic storage (CD).

**PART - 2**

Schedule of Prices (including Bill of Quantities) (to be filled by Bidder)

The bidder is expected to examine carefully the contents of the Bidding documents. Failure to comply with the requirements of bidding documents will be at the bidder's own risk. Pursuant to Clause 28, bids which are not substantially responsive to the requirements of the bidding documents will be rejected.

9. **Clarification of Bidding Documents**
- 9.1 A prospective bidder requiring any clarification of the bidding documents may notify the Employer in writing or by facsimile at the Employer's address indicated in the Invitation to Bid. The Employer will respond to any request for clarification, which it receives earlier than 14 days prior to the deadline for submission of bids. Copies of the Employer's response will be forwarded to all the bidders, including a description of the enquiry.
10. **Amendment of Bidding Documents**
- 10.1 At any time prior to the deadline for submission of bids, the Employer may, for any reason, whether at its own initiative or in response to a clarification requested by a prospective bidder, or based on the proceedings of the pre-bid conference modify the bidding documents by issuing addenda.
- 10.2 Any addendum thus issued shall be part of the bidding documents pursuant to Sub-Clause 8.1, and shall be communicated by the Employer in writing or email or by fax to all the Bidders. Prospective bidders shall acknowledge receipt of each addendum by fax to the Employer.
- 10.3 To afford prospective bidders reasonable time in which to take an addendum into account in preparing their bids, the Employer may extend the deadline for submission of bids, in accordance with Clause 21.

**C. PREPARATION OF BIDS**

11. **Language of Bid**
- 11.1 The bid, and all correspondence and documents, related to the bid, exchanged between the bidder and the Employer shall be written in the English language. Supporting documents and printed literature furnished by the bidder may be in another language provided they are accompanied by an accurate translation of the relevant passages in the

English language, in which case, for purposes of interpretation of the bid the English translation shall prevail.

**12. Documents comprising the Bid**

12.1 The bidder shall submit Technical and Price Bids separately. Technical bid will be opened first and evaluated. Price bid shall be opened only after the technical bid of a bidder is found acceptable.

12.2 Technical bid shall comprise of the following:

Bid form (without price details), Appendix to Bid, Bid security, the information on eligibility and qualification, schedules of supplementary information including those for alternatives, where proposed by the bidder and any other materials required to be completed and submitted by Bidders in accordance with these Instructions to Bidders. The documents listed of Volume II, Part 1 shall be filled in without exception, subject to extensions thereof in the same format. The Bidder shall also submit soft copy of Schedules along with the bid.

Technical bids containing commercial terms or bid price will be rejected.

12.3 Price bid shall comprise the following:

Bid form (with price details) and Appendix to Bid, priced Bill of Quantities, Price Bids for alternatives where proposed by the bidder and any other material required to be completed and submitted by Bidders in accordance with these Instructions to Bidders.

**13. Bid Prices**

13.1 Unless stated otherwise in the Bidding documents, the Contract shall be for the whole Works as described in Sub-Clause 1.1, based on prices submitted by the bidder.

13.2 The Bidder must quote unit Free at Site (FAS) prices of all items (alongwith Ex-works prices) for delivery of items to the actual site of erection including any storage, carriage (during transit and at site) by head load (if any) charges etc. as may be necessary. The unit FAS price shall comprise of the following components:

Ex-works price, packing and forwarding charges, railway freight, transport charges to actual work site, storage as where necessary, charges for transit insurance against all risks and storage after receipt

of equipment at destination stores, all taxes and duties and levies. Insurance of materials/equipment/goods at site is a mandatory requirement of the Royal Govt. of Bhutan.

13.3 The bidder shall fill in rates and prices for all items of the Works described in the Bill of Quantities. Items against which no rate or price is entered by the bidder will not be paid for by the Employer when executed and shall be deemed covered by the other rates and prices in the Bill of Quantities.

13.4 All duties, taxes and other levies payable by the Contractor in Bhutan under the Contract, or any other clause, as of the date 28 days prior to the deadline for submission of bids shall be included in the rates and prices and the total bid price submitted by the bidder, and the evaluation and comparison of bids by the Employer shall be made accordingly. It is the responsibility of the Bidder to ascertain the value of applicable tax rates (Bhutan Sales Tax and / or Customs Duty and or any other applicable taxes / duties) for various items under Price Schedule and indicate the same in the price schedules. It shall be noted that payment towards such taxes / duties in Bhutan, will be limited to the value obtained by using the rate quoted in the Bid, unless there is any change in rates notified by relevant authorities after the date 28 days prior to the submission of Bids. In the event of such change by relevant authorities, the differential amount (increase or decrease) will be based on the differential rates between revised notified value and the maximum of (i) the rates assumed by the Bidder in its offer and (ii) the actual rate prevalent at the time 28 days prior to the due date of bid submission.

13.5 The rates and prices quoted by the bidder shall not be subject to adjustment during the performance of the Contract in accordance with Clause 31 of the Conditions of Contract.

**14. Currency of Bid and Payment**

14.1 The unit rates and the prices shall be quoted by the bidder entirely in Bhutanese Ngultrum and the payment will be made in Bhutanese Ngultrum. Payment in other foreign currencies is not allowed. There will be no variation in prices for imported goods due to exchange rate fluctuations.

**15. Bid Validity**

15.1 Bids shall remain valid for a period of one hundred and twenty (120) days after the date of bid opening specified in Clause 24.

15.2 In exceptional circumstances, prior to expiry of the

original bid validity period, the Employer may request that the bidders extend the period of validity for a specified additional period. The request and the responses thereto shall be made in writing or by fax. A bidder may refuse the request without forfeiting its bid security. A bidder agreeing to the request will not be required or permitted to modify its bid, but will be required to extend the validity of its bid security for the period of the extension, and in compliance with Clause 16 in all respects.

**16. Bid Security**

16.1 The bidder shall furnish, as part of its bid, a bid security in the amount of Nu.500, 000.00 (Ngultrum five hundred thousand only).

16.2 The bid security shall, at the bidder's option, be in the form of a banker's certified cheque, cash warrant, standby letter of credit or bank guarantee from a reputable financial institution in Bhutan or counter guaranteed and by a reputable financial institution in Bhutan and should be enforceable & encashable in Bhutan. The bid security shall be drawn in favour of Chief Finance Officer, Finance & Accounts Services, Bhutan Power Corporation Limited, Thimphu, Bhutan, payable at Bank of Bhutan, Thimphu. The format of the bank guarantee shall be in accordance with the sample form of bid security included in Part 1 in Volume 2. Letters of credit and bank guarantees issued, as surety for the bid shall be valid for 28 days beyond the period of bid validity.

All the Bank Guarantees or securities/sureties associated with this tender like Bid Security, Performance Security etc. provided by the bidder shall be either from a Bank/Financial Institution in Bhutan or a Bank/Financial Institution outside Bhutan with a correspondent Financial Institution located in Bhutan to make these enforceable. This is a pre-requisite for the Bid to be considered responsive. Bid not conforming to this requirement shall be treated as non-responsive resulting in outright rejection of the Bid.

16.3 Any bid not accompanied by an acceptable bid security shall be rejected by the Employer as non-responsive.

16.4 The bid securities of unsuccessful bidders shall be returned after signing of the Contract, in any case not later than the expiration of the period of bid security validity.

16.5 The bid security of the successful bidder will be returned upon furnishing required performance security and signing of the Contract by bidder.

16.6 The bid security may be forfeited

- a) if the bidder withdraws its bid during the period of bid validity; or
- b) if the bidder does not accept the correction of its bid price, pursuant to Sub-Clause 29.2; or
- c) in the case of a successful bidder, if he fails within the specified time limit to
  - i. sign the Agreement, or
  - ii. furnish the required performance security.

17. **Alternative Proposals by Bidders**

17.1 Bidders wishing to offer technical alternatives to the requirements of the bidding documents must first price the Employer's design as described in the bidding documents and shall further provide all information necessary for a complete evaluation of the alternative by the Employer, including drawings, design calculations, technical specifications, breakdown of prices, and proposed construction methods. Only the technical alternatives, if any, of the lowest evaluated bidder conforming to the basic technical requirements shall be considered by the Employer for adoption, at the sole discretion of the Employer.

18. **Pre- Bid Meeting**

18.1 Delete

18.2 The bidder is requested to submit any questions in writing or by fax, to reach the employer not later than ten days before the bid submission date.

19. **Format and Signing of Bid**

- 19.1 The bidder shall prepare one original and two copies of the Bid documents (both Technical and Price) comprising the bid as described in Clause 12 of these Instructions to Bidders, bound with the volume containing the Form of Bid, and clearly marked "ORIGINAL" and "COPY" as appropriate, on both the bids. In the event of discrepancy between them, the original shall prevail.
- 19.2 The original and all copies of the Technical and Price bids shall be typed or written in indelible ink (in the case of copies, photostats are also acceptable) and shall be signed by a person or persons duly authorised to sign on behalf of the bidder, pursuant to Sub-Clause 4.1 a) or 4.2 c), as the case may be. All pages of the bid where entries or amendments have been made shall be initialed by the person or persons signing the bid.
- 19.3 The Technical and Price bids shall contain no alterations, omission or additions, except those to comply with instructions issued by the Employer, or as necessary to correct errors made by the bidder, in which case such corrections shall be initialed by the person or persons signing the bid.

**D. SUBMISSION OF BIDS**

20. **Sealing and Marking of Bids**

- 20.1 The bidder shall seal the original and each copy of the Technical bid in an inner and an outer envelope, duly marking the envelopes as " TECHNICAL BID - ORIGINAL " and "TECHNICAL BID - COPY".
- 20.2 The bidder shall seal the original and each copy of the Price bid in an inner and an outer envelope, duly marking the envelopes as "PRICE BID- ORIGINAL " and " PRICE BID - COPY".
- 20.3 The inner and outer envelopes shall
- a) be addressed to the Employer at the following address :  
General Manager,  
Distribution and Customer Service  
Department  
Bhutan Power Corporation Limited,  
Thimphu, Bhutan.  
Phone: (975) (2) 333577 / 325095 extn. 201  
Fax : (975) (2) 324031 / 325095 extn. 500
  - b) bear the following identification:

Bids for the Improvement and Up-gradation  
of the Samdrup Jongkhat- Phase I.

Bid Reference Number :  
BPC/DCSD/UED/C-20

DO NOT OPEN BEFORE:  
14.02.2012, 15:00 hours

- 20.4 In addition to the identification required in Sub-Clause 20.3, the inner envelope shall indicate the name and address of the bidder to enable the bid to be returned unopened in case it is declared "late" pursuant to Clause 22.
- 20.5 If the outer envelope is not sealed and marked as above, the Employer will assume no responsibility for the misplacement or premature opening of the bid.
21. **Deadline for Submission of Bids**
- 21.1 Bids must be received by the Employer at the address specified above no later than 1430 hours on 14.02.2012.
- 21.2 The Employer may, at his discretion, extend the deadline for submission of bids by issuing an addendum in accordance with Clause 10 in which case all rights and obligations of the Employer and the bidders previously subject to the original deadline will thereafter be subject to the deadline as extended.
22. **Late Bids**
- 22.1 Any bid received by the Employer after the deadline for submission of bids prescribed in Clause 21 will be rejected and returned unopened to the bidder.
23. **Modification and Withdrawal of Bids**
- 23.1 The bidder may modify or withdraw its bid after bid submission, provided that written notice of the modification or withdrawal is received by the Employer prior to the deadline for submission of bids.
- 23.2 The bidder's modification or withdrawal notice shall be prepared, sealed, marked and delivered in accordance with the provisions of Clause 20, with the outer and inner envelopes additionally marked "MODIFICATION" or "WITHDRAWAL", as appropriate. A withdrawal notice may also be sent by fax but must be followed by a signed confirmation copy.

- 23.3 No bid may be modified by the bidder after the deadline for submission of bids.
- 23.4 Withdrawal of a bid during the interval between the deadline for submission of bids and the expiration of the period of bid validity specified in the Form of Bid may result in the forfeiture of the bid security pursuant to Clause 16.

**E. BID OPENING AND EVALUATION**

**24. Bid Opening**

- 24.1 The Employer will open the Technical bids, including modifications made pursuant to Clause 23, in the presence of bidders' representatives who choose to attend, at 1500 hours on 14.02.2012 at the Conference Hall of BPC, Thimphu. The bidders' representatives who are present shall sign an attendance sheet evidencing their attendance.
- 24.2 Envelopes marked "WITHDRAWAL" shall be opened and read out first. Bids for which an acceptable notice of withdrawal has been submitted pursuant to Clause 23 shall not be opened.
- 24.3 The bidders' names, bid modifications and withdrawals, the presence or absence of bid security, and such other details as the Employer may consider appropriate, will be announced and recorded by the Employer at the opening. The bidder's representatives will be required to sign the record.
- 24.4 The Employer shall prepare, besides the record of bid opening, minutes of the bid opening, including the information disclosed to those present in accordance with Sub-Clause 24.3.

**25. Opening of Price Bids**

- 25.1 After the technical evaluation, the price bids of technically qualified Bidders shall be opened on such other date to be informed to the technically qualified bidders.
- 25.2 The Price envelopes of only the technically responsive bidders shall be opened. The Price envelopes of technically non-responsive bidders shall be returned unopened to respective Bidders.
- 25.3 The names of responsive Bidders, their bid prices, the total amount of each, any discount shall be announced and recorded by the Employer at the bid opening. Any bid price, discount or alternative bid price which is not read out and recorded at bid opening will not be taken in account in bid evaluation. The Bidders' representatives who are

present shall sign an attendance sheet evidencing their attendance.

26. **Process to be Confidential** 26.1 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 until the award to the successful bidder has been announced. Any effort by a bidder to influence the Employer's processing of bids or award decisions may result in the rejection of the bidder's bid.
27. **Clarification of Bids** 27.1 To assist in the examination, evaluation and comparison of bids, the Employer may, at its discretion, ask any bidder for clarification of its bid, including technical data and breakdown of unit rates. The request for clarification and the response shall be in writing or by fax, but no change in the price or substance of the bid shall be sought, offered or permitted except as required to confirm the correction of arithmetic errors discovered by the Employer in the evaluation of the bids in accordance with Clause 30.
28. **Preliminary Examination of Bids and Determination of Responsiveness** 28.1 Prior to the detailed evaluation of bids, the Employer will determine whether each bid i) meets the eligibility criteria; ii) has been properly signed; iii) is accompanied by the required securities; iv) is substantially responsive to the requirements of the bidding documents; and v) provides any clarification and/or substantiation that the Employer may require pursuant to Clause 27.
- 28.2 A substantially responsive bid is one, which conforms to the terms, conditions and specifications of the bidding documents, without material deviation or reservation. A material deviation or reservation is one i) which affects in any substantial way the scope, quality or performance of the Works; ii) which limits in any substantial way, inconsistent with the bidding documents, the Employer's rights or the bidder's obligations under the Contract; or iii) whose rectification would affect unfairly the competitive position of other bidders presenting substantially responsive bids.
- 28.3 If a bid is not responsive, it will be rejected by the Employer, and may not subsequently be made responsive by correction or withdrawal of the non-conforming deviation or reservation.
29. **Correction of Errors** 29.1 Bids determined to be substantially responsive will be checked by the Employer for any arithmetic

errors. Arithmetic errors will be rectified on the following basis. If there is a discrepancy between the unit rate and the total cost per item that is obtained by multiplying the unit rate and quantity, the unit rate shall prevail and the total cost per item will be corrected unless in the opinion of the Employer there is an obvious misplacement of the decimal point in the unit rate, in which case the total cost per item as quoted will govern and the unit rate corrected. If there is a discrepancy between the total bid amount and the sum of total costs per item, the sum of the total costs per item shall prevail and the total bid amount will be corrected.

29.2 The amount stated in the Form of Bid will be adjusted by the Employer in accordance with the above procedure for the correction of errors and, shall be considered as binding upon the bidder. If the bidder does not accept the corrected amount of bid, its bid will be rejected, and the bid security may be forfeited in accordance with Sub-Clause 16.6 (b).

**30. Evaluation and Comparison of Bids**

30.1 The Employer will evaluate and compare only the bids determined to be responsive in accordance with Clause 28.

30.2 In evaluating the bids, the Employer will determine for each bid the Evaluated Bid Price by adjusting the Bid Price as follows :

- a) making any correction for errors pursuant to Clause 29;
- b) excluding Provisional Sums and the provision, if any, for Contingencies in the Summary Bill of Quantities, but including Daywork, where priced competitively;
- c) making an appropriate adjustment for any other acceptable variations, or deviations; and
- d) applying any discounts offered by the bidder for the award.

30.3 The Employer reserves the right to accept or reject any variation or deviations. Variations, and other factors, which are in excess of the requirements of the bidding documents or otherwise result in the accrual of unsolicited benefits to the Employer shall not be taken into account in bid evaluation.

30.4 The estimated effect of the price adjustment provisions of the Conditions of Contract, applied

over the period of execution of the Contract, shall not be taken into account in bid evaluation.

- 30.5 If the bid of the successful bidder is seriously unbalanced in relation to the Engineer's estimate of the cost of work to be performed under the Contract, the Employer may require the bidder to produce detailed price analyses for any or all items of the Bill of Quantities, to demonstrate the internal consistency of those prices with the construction methods and schedule proposed. After evaluation of the price analyses, the Employer may require that the amount of the performance security set forth in Clause 35 be increased at the expense of the successful bidder to a level sufficient to protect the Employer against financial loss in the event of default of the successful bidder under the Contract.

## **F. AWARD OF CONTRACT**

31. **Award**
- 31.1 Subject to Clause 32, the Employer will award the Contract to the bidder whose bid has been determined to be substantially responsive to the bidding documents, provided that such bidder has been determined to be i) eligible in accordance with the provisions of Sub-Clause 2.1; and ii) qualified in accordance with the provisions of Clause 4.
- It is not binding on the Employer to place order on the lowest (evaluated) priced Bid. The reasonability of prices will be duly considered in the evaluation.
32. **Employer's Right to Accept any Bid and to Reject any or all Bids**
- 32.1 Bids will be rejected if:
- a) Technical bid contains price/commercial terms.
  - b) Any conditional bids.
  - c) Bids that do not comply with completion time stated in Clause 1.3.
  - d) Deviations to commercial and payment terms are taken by the Bidder.
  - e) Non submission of proper GTPs
- 32.2 Notwithstanding Clause 31, the Employer 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 grounds for the Employer's action.
33. **Notification of**
- 33.1 Prior to expiration of the period of bid validity  
Section 1A - 19

## **Award**

prescribed by the Employer, the Employer will notify the successful bidder by fax confirmed by registered letter that its bid has been accepted. This letter (hereinafter called the "Letter of Acceptance") shall name the sum which the Employer will pay the Contractor in consideration of the execution, completion and maintenance of the Works by the Contractor as prescribed by the Contract (hereinafter and in the Conditions of Contract called "the Contract Price").

33.2 The notification of award will constitute the formation of the Contract.

33.3 Upon furnishing by the successful bidder of a performance security, the Employer will promptly notify the other bidders that their bids have been unsuccessful.

## **34. Signing of Agreement**

34.1 At the same time that the Employer notifies the successful bidder that its bid has been accepted, the Employer will intimate the date of signing of the agreement to the Bidder.

34.2 The Agreement shall be signed within twenty eight (28) days of receipt of Letter of Acceptance from the Employer.

## **35. Performance Security**

35.1 Within twenty eight (28) days of receipt of the Letter of Acceptance from the Employer, the successful bidder shall furnish to the Employer a performance security in an amount of ten (10) percent of the Contract Price in accordance with the Conditions of Contract. The form of performance security provided in Part -1 of Volume II of the bidding documents shall be used.

35.2 Failure of the successful bidder to comply with the requirements of Clauses 34 or 35 shall constitute sufficient grounds for the annulment of the award and forfeiture of the bid security.

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Section 1B – Condition of Contract  
for E&M works

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## **PREAMBLE**

<b>The Employer</b>	Sub-Clause 1.1.12. The Employer is Bhutan Power Corporation Limited, Distribution and Customer Services Department.
<b>The Engineer</b>	Sub-Clause 1.1.15. The Engineer is as appointed by BPC for the works.
<b>Time for Completion</b>	Sub-Clause 1.1.35. Time for Completion is 18 months from the date handing over of the site.
<b>Contractor's Profit</b>	Sub-Clause 1.6 The percentage to cover profit entitlement, where appropriate, is %. (maximum) Separate % is not admissible. The percentage profit shall be inclusive along with overheads, and all other charges.
<b>Ruling Language</b>	Sub-Clause 5.1. The version in English language (ruling language) shall prevail.
<b>Day to Day Communications</b>	Sub-Clause 5.2. The language for day to day communications is English.
<b>Program to be Furnished</b>	Sub-Clause 12.1. The program must be submitted in the form of MS Project.
<b>Electricity, Water, Gas and Other Services</b>	Sub-Clause 14.3.  The Contractor shall make his own arrangements for the required services related to electricity including extension of temporary lines, internal wiring, water, stores from relevant authorities. BPC shall provide liaisoning assistance only. All the costs incurred against these services shall be borne by the Contractor.
<b>Employer's Equipment</b>	Sub-Clause 14.4. The following Employer's equipment is available for use by the Contractor under the Employer's operation: The clause is not applicable. The Contractor shall make his own arrangements for all the related equipments required for the project.

<b>Working Hours</b>	Sub-Clause 18.3. It shall be as per the Labour Laws of Bhutan. The normal working hours are: 8 am to 6 pm. Sundays are considered the days for rest. Also refer Conditions of Contract Part II Special Conditions
<b>Delay in Completion</b>	Sub-Clause 27.1. Failure to meet the Time for Completion entitles the Employer to reduction in Contract Price as follows: Refer Conditions of Contract Part II Special Conditions.
<b>Prolonged Delay</b>	Sub-Clause 27.2. Maximum amount recoverable from the Contractor by the Employer: Not stated and will be recovered as detailed in Clause 27.2.
<b>Terms of Payment</b>	Sub-Clause 33.1. The terms of payment shall be as indicated in Conditions of Contract Part II Special Conditions. The time of payment shall be 45 days from the date of submission of bills and proper documents as mentioned in clause 33.1 and 33.2 of the special conditions.
<b>Payment in Foreign Currencies</b>	Sub-Clause 35.1. Payment in foreign currencies shall be arranged as follows: Clause is not applicable.
<b>Rates of Exchange</b>	Sub-Clause 35.3. The rates of exchange for the purpose of the Contract are: Clause is not applicable.
<b>Payment against Provisional Sums</b>	Sub-Clause 36.4. The percentage to be applied to Provisional Sums shall be Sums. Clause is not applicable.
<b>Maximum Liability</b>	Sub-Clause 42.2. The maximum liability of the Contractor to the Employer shall be: Contract Price.
<b>Insurance of Works</b>	Sub-Clause 43.1. The deductible limit in the insurance cover of the Works shall not exceed : Deductible limit is not applicable. The Contractor shall insure the Works to cover full amount. Sub-Clause 43.1. (a) The additional risks to be insured are: Nil.
<b>Third Party Liability</b>	Sub-Clause 43.3. The amount of insurance against third party liability taken out by the Contractor shall not be less than: Rs. One (1) Lakh.

<b>Payment on Termination for Employer's Default</b>	<p>Sub-Clause 46.3.  The additional amount payable by the Employer on termination shall not exceed:  Clause is not applicable.</p>
<b>Labour, Materials and Transport</b>	<p>Sub-Clause 47.1.  Clause is not applicable.</p>
<b>Notices to Employer and Engineer</b>	<p>Sub-Clause 49.2.  The address of the Employer for notice is:  General Manager,  Distribution and Customer Services Department,  Bhutan Power Corporation Limited,  Thimphu, Bhutan.  Telephone : +975 – 2- 333577/327529   Fax :+975-2- 322279</p> <p>The address of the Engineer for notices is:  Manager,  Urban Electrification Division  Distribution and Customer Services Department  Bhutan Power Corporation Limited  Thimphu, Bhutan.  Telephone - +975 – 2- 321846, Fax – +975-2-321847</p>
<b>Applicable Law</b>	<p>Sub-Clause 51.1.  The applicable law is Bhutanese law.</p>
<b>Procedural Law for Arbitration</b>	<p>Sub-Clause 51.2.  The procedural law for arbitration is as per prevalent laws in Bhutan.</p>
<b>Language and Place of Arbitration</b>	<p>Sub-Clause 51.3.  The language of arbitration is English language.  The place of arbitration is Thimphu, Bhutan.</p>

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## Section 1C – Conditions of Particular Application

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## **SECTION 3**

### **CONDITIONS OF CONTRACT**

#### **PART II - CONDITIONS OF PARTICULAR APPLICATION**

##### **Notes on the Conditions of Particular Application**

(The Clause referred to in Part II are those where the provision in the General Conditions (Part I i.e Section 1B) refer to an alternative solution to be stated in Part II. The provisions in the General Conditions will apply unless an alternative solution is given in Part II. The clauses in this section need therefore not be completed, but must be completed if alternative solutions to the relevant Part I provision are necessary).

## **Section A**

### **Sub Clause 1.1.1 Conditions Precedent to Commencement**

Item ii) to v) are not applicable.

### **Sub Clause 1.1.11 Defects Liability Period**

The defects liability period shall be one year from the date of proper taking over of the Works.

### **Sub-Clause 5.3**

Delete the documents listed 1 –5 and substitute :

#### **Priority of Contract Documents**

1. The Contract Agreement;
2. The Letter of Acceptance;
3. The Preamble
4. Amendments
5. The Conditions of Contract Part II (Section 1C);
6. The Conditions of Contract Part I (Section 1B)
7. The specifications.

In case of conflict, if any, in Clauses of 1 to 6 above, the decision and interpretation of the contract by the Employer shall be final.

### **Sub Clause 6.6 Operation & Maintenance Manuals**

Operation and Maintenance manuals shall be in English language.

### **Sub Clause 6.9 Manufacturing Drawings**

The Contractor is required to disclose to the Engineer or the Employer confidential information such as manufacturing defects noticed in the equipment after installation at other Works site, decisions such as termination of product within ten (10) years of supply of the product etc.

### **Sub-Clause 7.2 Errors by Employer or Engineer**

Clause is not applicable. The contractor to make the assessment of the drawings and any errors, omissions and discrepancies need to be immediately brought to the notice of the BPC during the time of bidding only. The drawings and designs enclosed with the Bidding document are for Bid purpose only.

### **Sub-Clause 8.1 Contractor's General Responsibilities**

The Employer shall not provide any facilities to the Contractor at the Work site. The Contractor shall make his own arrangements with respect to the same. The Employer shall provide assistance for obtaining necessary clearances etc. However, all the related expenses shall be borne by the Contractor.

**Sub-Clause 10.1  
Performance  
Security**

Replace the text of Sub-Clause 10.1 with the following :

"The Contractor shall provide security for his proper performance of the Contract to the Employer within 28 days after the receipt of the Letter of Acceptance. The performance security shall be for 10% of the Contract Amount and shall be in the form of a bank guarantee, issued either (a) by a bank located in Bhutan or a foreign bank through a correspondent bank located in Bhutan or (b) directly by a foreign bank acceptable to the Employer. When providing such security to the Employer, the Contractor shall also notify the Engineer.

Without limitation to the provisions of the preceding paragraph, whenever the Engineer determines an addition to the Contract Price as a result of a change in cost and/or legislation or as a result of a variation amounting to more than 25 percent of the portion of the Contract Price payable in a specific currency, the Contractor, at the Engineer's written request, shall promptly increase the value of the performance security in that currency by an equal percentage.

The cost of complying with the requirements of this Clause shall be borne by the Contractor."

**Sub-Clause 12.1  
Program to be  
Furnished**

"The time within which the program shall be submitted shall be twenty eight (28) days."

**Sub Clause 14.1  
Contractor's Equipment**

The Contractor shall provide all the equipment necessary to complete the works.

**Sub-Clause 18.3  
Working Hours**

The second para. shall be modified as follows:

"Subject to any provision contained in the Contract, the Contractor shall have the option to work by day and by night after obtaining prior permission of the Employer, Ministry of Home Affairs, Police and Ministry of Labour. However, under any circumstances extra claim(s) towards the same will not be entertained."

**Sub-Clause 20.4  
Facilities for Testing**

Following shall be added at the end of para.

‘The Contractor shall also bear the cost towards conveyance (to & fro) of the Employer’s/Engineer’s representative from the nearest railway station / airport to manufacturer’s works and local transport during the inspection trips and meetings in India.’

**Sub-Clause 22.1  
Permission to Delivery**

‘Engineer’ shall be replaced by ‘Employer’

**Sub-Clause 25.1  
Time for Completion**

Time for completion shall be **18** months from the date of handing over of the site. The time of completion shall also include the period between completion of commissioning and commercial utilization by the employer.

**Sub-Clause 26.1 Extension  
of Time for Completion**

Following shall be added as:

‘Contractors shall not be entitled for claims of establishment charges, day to day operation cost, hiring of vehicle, salaries of employees etc. for the extended period of stay and ideal labour charges arising out off any circumstances. Such expenses are deemed to be included in Contractor’s Risks.’

**Sub-Clause 27.1  
Delay in  
Completion**

Add / modify as follows:

"If the Contractor does not complete the Works as per completion period stated in the Contract Agreement, then the damages for delay shall become payable by the Contractor. The Liquidated Damages shall be levied @ 0.1% for every day of delay or the part thereof for unfinished portion of work subjected to a maximum of 10% of Contract Value."

**Sub-Clause 30.4  
Extension of Defects  
Liability**

The last para. of the Sub- Clause shall be deleted and modified as follows:

“When progress in respect of Plant has been suspended under Sub-Clause 23.1, the Contractor’s obligations under this Clause shall not apply to any defects occurring more than one year after the Time for Completion established on the date of the Letter of Acceptance.”

**Sub Clause 30.9  
Defects in Employer’s and  
Engineer’s Designs**

Clause is not applicable and is deleted.

**Sub-Clause 31.3  
Adjustment of the  
Contract Price**

Delete the Clause and add the following:

“If the Contractor and the Engineer are unable to agree on the adjustment of the Contract price, the adjustment shall be determined in accordance with the rates specified in the Schedule of Prices.

If the rates contained in the Schedules are not directly applicable to the specific work in question, suitable rates shall be established by the Engineer reflecting the level of pricing in the Schedule of Prices.

Where the rates are not contained in the said Schedule, the amount shall be such as is in all the circumstances reasonable. Else the rates shall be derived based on joint observation of cost shall be recorded and payment shall be made on the basis of quotation or the actual invoices from the manufacturer, actual taxes and duties, transportation charges and 20% on ex-works towards Contractors overheads .

**Clause 33**

Clause 33 of the General Conditions shall be deleted and the following Sub- Clauses 33.1 to 33.16 are substituted therefore:

**Sub-Clause 33.1  
Terms of Payment  
Equipment**

Payment for supply of equipment will be made as under:

- a) 10 % advance pursuant to Sub Clause 33.9 below.
- b) 80% Payment against delivery of equipment/materials as covered in Bill of Quantities of the Contract. The invoice for claiming 80% payment should be accompanied by the following documents.
  - i. Proof of delivery: Submission of entry proof in Bhutan duly certified by the Revenue & Customs Department.
  - ii. Contractor’s detailed invoice giving full particulars of the equipment/material, status of supplies, payment received (format shall be obtained from UED).
  - iii. Detailed packing list.
  - iv. Inspection reports and Test Certificates.
  - v. Certificates of BST/Taxes paid in Bhutan and India.
  - vi. Certification of excise duty payment in India.
  - vii. Physical verification and certification by Engineer
  - viii. Submission of Monthly Progress report
  - ix. BST shall be reimbursed separately based on the submission of original receipts (refer sub clause 48.1 and 52.3 )

- x. Three copies of invoices and above document shall be submitted for the claims.
- c) Balance 10% Payment: After the "Taking over" of the Works and issue of Performance Certificate by the Employer's representative and submission of Bank Guarantee by the Contractor of equivalent amount to cover defect liability period.

**Sub-Clause 33.2  
Terms of payment  
Erection & Civil Works**

Payment for Erection of Equipment and Civil Works will be made as under:

- a) 10 % advance pursuant to Sub Clause 33.9 below.
- b) 80% Payment upto an extent of 80% of contract value would be made periodically in each quarter on presentation of erection or civil works invoice giving full details of the work done and joint measurements during the quarter along with updated statement showing the status of payments due and received against receipt of monthly progress reports. Three copies of invoices and joint measurements sheets shall be submitted for the claims.
- c) Balance: 10%: Payment would be released on successful commissioning and "Taking Over" of the works and issue of Performance Certificate by the Employer's Representative and submission of Bank Guarantee by the Contractor of an equivalent amount to cover the defect liability period.

**Sub-Clause 33.3  
Quarterly Statement**

The Contractor shall submit a statement in three (3) copies to the Engineer at the end of each quarter, in a tabulated form approved by the Engineer, showing the amounts to which the Contractor considers himself to be entitled. The statement shall include the following items, as applicable, which shall be taken into account in the sequence listed:

- a) the estimated contract value of the Temporary and Permanent Works executed up to the end of the quarter in question, at base unit rates and prices and in bid currency;
- b) the actual value certified for payment for the Temporary and Permanent Works executed up to the end of the previous quarter, at base unit rates and prices and in bid currency;

- c) the estimated contract value at base unit rates and prices of the Temporary and Permanent Works for the quarter in question, in bid currency, obtained by deducting (b) from (a);
- d) the value of any variations executed up to the end of the quarter in question, less the amount certified in the previous Interim Payment Certificate, pursuant to Clause 31.3;
- e) any amount to be withheld under the retention provisions of Sub-Clause 33.7, determined by applying the percentage set forth in Sub-Clause 33.7 due under paragraphs 33.3 (d).
- f) any amounts to be deducted as repayment of the Advance under the provisions of Sub-Clause 33.9; and
- g) Any other sum, to which the Contractor may be entitled under the Contract.

**Sub-Clause 33.4  
Quarterly Payment**

- a) The said statement shall be approved or amended by the Engineer in such a way that, in his opinion, it reflects the amounts due to the Contractor in accordance with the Contract, after deduction, other than pursuant to Clause 27.1, of any sums which may have become due and payable by the Contractor to the Employer. In cases where there is a difference of opinion as to the value of any item, the Engineer's view shall prevail. Within 28 days of receipt of the quarterly statement referred to in Sub - Clause 33.3, Engineer shall determine the amounts due to the Contractor and shall issue to the Employer and the Contractor a certificate herein called "Interim Payment Certificate", certifying the amounts due to the Contractor.

Notwithstanding the terms of this Clause or any other Clause of the Contract, no amount will be certified by the Engineer for payment, until the performance security has been provided by the Contractor and approved by the Employer.

**Sub-Clause 33.6  
Place of Payment**

Payments to the Contractor by the Employer shall be made in Indian Rupees/Bhutanese Ngultrum into a bank account or accounts nominated by the Contractor. If the payment has to be made by bank draft/cheque, the charges for preparation of draft/cheques, etc. shall be to the Contractor's account.

**Sub-Clause 33.7 Retention Money**

A retention amounting to 10 percent of the amounts due in each currency, determined in accordance with the procedure set out in Sub-Clause 33.3 (f) shall be made by the Engineer in the first and following Interim Payment Certificates.

**Sub-Clause 33.8 Payment of Retention Money**

Upon the expiration of the Defects Liability Period for the Works the Retention Money shall be certified by the Engineer for payment to the Contractor (or return of the bank guarantee, as the case may be.). Provided that, in the event of different Defects Liability Periods being applicable to different Sections or parts of the Permanent Works pursuant to Clause 29.2, the expression “expiration of the Defects Liability Period” shall, for the purposes of this Sub-Clause, be deemed to mean the expiration of the latest of such periods. Provided also that if at such time, there shall remain to be executed by the Contractor any work instructed, pursuant to Clauses 30.1 and 30.10, in respect of the Works, the Engineer shall be entitled to withhold certification until completion of such work of so much of the balance of the Retention Money as shall, in the opinion of the Engineer, represent the cost of the work remaining to be executed.

**Sub-Clause 33.9  
Advance  
Payment**

- a) The Employer will make an interest-free advance payment to the Contractor exclusively for the costs of mobilization in respect of the Works in an amount equivalent to 10 percent of the Contract Price named in the Letter of Acceptance. Payment of such advance amount will be due under separate certification by the Engineer after (i) execution of the Form of Agreement by the parties hereto; (ii) provision by the Contractor of the performance security in accordance with Sub-Clause 10.1; and (iii) provision by the Contractor of an unconditional bank guarantee in a form and by a bank acceptable to the Employer in amount equal to the advance payment. Such bank guarantee shall remain effective until the advance payment has been repaid pursuant to paragraph (b) below, but the amount thereof shall be progressively reduced by the amount repaid by the Contractor as indicated in Interim Payment Certificates issued in accordance with this Clause.
- The payment shall be released only after following conditions are met:
- a. Site office setup with a provision of Guesthouse.
  - b. Appointment of Project Manager and his presence at site.
  - c. Mobilization of construction equipment.
  - d. Mobilization of adequate labourers for immediate activities.
- b) The advance payment shall be repaid through percentage deductions from the interim payments certified by the Engineer in accordance with the Clause. Deductions shall commence in the first Interim Payment Certificate, and shall be made at the rate of 10 percent of the amount of all Interim Payment Certificates in the currency of the advance payment until such time as the advance payment has been repaid; always provided that the advance payment shall be completely repaid prior to the time when 80 percent of the Contract Price has been certified for payment.

**Sub-Clause 33.10  
Time of Payment  
and Interest**

The amount due to the Contractor under any Interim Payment Certificate issued by the Engineer pursuant to this Clause, or to any other term of the Contract, shall subject to Clause 27.1, be paid by the Employer to the Contractor within 45 days after the receipt of bill and invoices along with joint measurement sheets and Contractor's quarterly statement by the Engineer for certification or, in the case of the Final Certificate pursuant to Sub-Clause 33.13, within 84 days after the agreed Final Statement and written discharge have been submitted to the Engineer for certification.

**Sub-Clause 33.11  
Correction of  
Certificates**

The Engineer may by any Interim Payment Certificate make any correction or modification in any previous Interim Payment Certificates which has been issued by him, and shall have authority, if any work is not being carried out to his satisfaction, to omit or reduce the value for such work in any Interim Payment Certificate.

**Sub-Clause 33.12  
Statement of  
Completion**

Not later than 84 days after the issue of the Taking-Over Certification in respect of the whole of the Works, the Contractor shall submit to the Engineer six copies of Statement of Completion with supporting documents showing in detail, in the form approved by the Engineer.

- a) The final value of all work done in accordance with the Contract upto the date stated in such Taking-Over Certificate;
- b) Any further sums which the Contractor considers to be due; and
- c) An estimate of amounts, which the Contractor considers, will become due to him under the Contract.

The estimated amounts shall be shown separately in such Statement of Completion. The Engineer shall certify payment in accordance with Sub-Clause 33.4.

**Sub-Clause 33.13  
Final Statement**

Not later than 56 days after the issue of the Defects Liability Certificate pursuant to Sub-Clause 30.11, the Contractor shall submit to the Engineer for consideration six copies of a draft final statement with supporting documents showing in detail, in the form approved by the Engineer,

- a) The value of all work done in accordance with the Contract; and

- b) Any further sums which the Contractor considers to be due to him under the Contract or otherwise.

If the Engineer disagrees with or cannot verify any part of the draft final statement, the Contractor shall submit such further information as the Engineer may reasonably require and shall make such changes in the draft as may be agreed between them. The Contractor shall then prepare and submit to the Engineer the final statement as agreed (for the purposes of these Conditions referred to as the “Final Statement”).

If, following discussions between the Engineer and the Contractor and any changes to the draft final statement which may be agreed between them, it becomes evident that a dispute exists, the Engineer shall issue to the Employer an Interim Payment Certificate for those parts of the draft final statement which are not in dispute. The dispute shall then be settled in accordance with Clause 50. The Final Statement shall bear agreed upon settlement of the dispute.

**Sub-Clause 33.14  
Discharge**

Upon submission of the Final Statement, the Contractor shall give to the Employer, with a copy to the Engineer, a written discharge confirming that the total of the Final Statement represents full and final settlement of all money due to the Contractor arising out of or in respect of the Contract. Provided that such discharge shall become effective only after payment due under the Final Payment Certificate issued pursuant to Sub-Clause 33.15 has been made and the performance security referred to in Sub-Clause 10.1 has been returned to the Contractor.

**Sub-Clause 33.15  
Final Payment  
Certificate**

Within 40 days after receipt of the Final Statement and the written discharge, the Engineer shall issue to the Employer (with a copy to the Contractor) a Final Payment Certificate stating

- a) the amount which, in the opinion of the Engineer, is finally due under the Contract or otherwise, and
- b) After giving credit to the Employer for all amounts previously paid by the Employer and for all sums to which the Employer is entitled, other than Clause 27.1, the balance, if any, due from the Employer to the Contractor or from the Contractor to the Employer as the case may be.

**Sub-Clause 33.16  
Cessation of  
Employer's  
Liability**

The Employer shall not be liable to the Contractor for any matter or thing arising out of or in connection with the Contract or execution of the Works, unless the Contractor shall have included a claim in respect thereof in his Final Statement and (except in respect of matters or things arising after the issue of the Taking-Over Certificate in respect of the whole of the Works) in the Statement of Completion referred to in Sub-Clause 33.12.

**Sub-Clause 37.2  
Employer's Risks**

Sub-Clause 37.2 g) shall be deleted.

**Sub-Clause 43.1 and 43.2  
Insurance  
The Works and  
Contractor's  
Equipment**

Add the following words at the end of Sub-Clause 43.1 and 43.2:

", it being understood that such insurance shall provide for compensation to be payable in currency of bid required to rectify the loss or damage incurred." Royal Insurance Corporation of Bhutan (RICB) is a premium insurance company of Bhutan. The Contractor has to ensure that insurance coverage for the Project is made through RIBC.

**Sub-Clause 43.6  
Permitted Exclusions  
from Insurance Policies**

Sub-clause 43.6 is amended to read as follows :

"There shall be no obligation for the insurances in Sub-Clause 43.1 to include loss or damage caused by the risks listed under Sub-Clause 43.6 paras. a) to d)".

**Sub Clause 46.1  
Employer's Default**

Sub Clause 46.1 e) is deleted.

**Sub-Clause 48.1  
Taxes and Duty**

Delete the Clause and add the following:

'The Contractor shall be responsible for payment of all taxes, duties, levies, royalties, etc., as applicable in Bhutan & India and shall be included in FAS price.'

## **Additional Clauses**

### **Clause 52 Taxation**

#### **Sub-Clause 52.1 Foreign Taxation**

The prices bid by the Contractor shall include all taxes, duties and other charges imposed outside the Employer's country on the production, manufacture, sale and transport of the Contractor's Equipment, Plant, materials and supplies to be used on or furnished under the Contract, and on the services performed under the Contract.

#### **Sub-Clause 52.2 Local Taxation**

The prices bid by the Contractor shall include all duties, import duties, business taxes, income and other taxes that may be levied in accordance to the laws and regulations in being as of the date 28 days prior to the closing date for submission of bids in the Employer's country on the Contractor's Equipment, Plant, materials and supplies (permanent, temporary and consumable) acquired for the purpose of the Contract and on the services performed under the Contract. Nothing in the Contract shall relieve the Contractor from his responsibility to pay any tax that may be levied in the Employer's country on profits made by him in respect of the Contract.

#### **Sub-Clause 52.3 Custom Duty & Bhutan Sales Tax**

The Contractor shall be responsible for payment of all levies, royalty, taxes, etc. as applicable in Bhutan. Bhutan Sales Tax and Custom Duty are applicable at the entry check post.

It is the responsibility of the bidders to make themselves conversant with the relevant rules and regulations on taxation policy of Bhutan from the RRCO (Regional Revenue and Customs Office at Thimphu or Phuentsholing). As far as possible, the Contractor shall procure the materials required for the construction works such as cement, steel rods, etc. within Bhutan. BST shall not be reimbursed for items of schedule C (civil works supply materials).

The contractor will have to pay BST and Custom Duty at the entry check post and submit the following documents for reimbursement claims to Employer's representative.

- a) Original money receipt of Revenue and Customs Divisions
- b) Original Source vendor invoice/bill/cash memo of materials for which BST & Customs Duty is paid as reflected in the above receipt duly stamped by Custom authorities of Bhutan

Employer will refund the claim after getting the refund from Revenue and Custom Department. The payment towards such taxes/duties in Bhutan will be subject to the ceiling of amount obtained by using applicable rate on the quoted ex-works prices. The reimbursement of BST however will not be applicable for goods/materials procured within Bhutan.

In case of misuse of the permit/material, suitable penal deduction shall be made from the Contractor's bill up to 5 times the BST levy able on such materials.

On completion of the works, if it is observed that excess goods/materials have been procured by the Contractor, the BST/Custom Duty reimbursed by the contractor in case of these materials will have to be refunded to the Employer by the Contractor. These excess goods/materials will be assessed based on the consumption statement entered in the Measurement Books (MBs).

The provisions as above do not apply to the supply items under the contract, which have separate unit rates in the contract along with applicable BST and CD rates, as quoted at the time of Bid. For these items, the payment for BST / CD will be based on the actual payment made by the Contractor, subject to the ceiling derived based on the rate (in %) of BST/CD assumed by the Contractor at the time of Bid for each of the items. However, in the event there is change in the applicable BST / CD rates (in %) after 28 days prior to the due date for submission of the Bid, the applicable differential rate shall be based on the difference between the quoted rate (in %) and the new rate (in %), subject to such differential being lower than the difference in correct rates (in %) prior to 28 days before scheduled date for submission of Bids and the new rates (in %).

**Sub-Clause 52.4  
Business Income Tax &  
Foreign Contractor Tax**

The Contractor will have to pay Business Income Tax in Bhutan. Presently, the applicable Contractor Tax (FCT) is 3% for non-nationals and 2% for Bhutanese Contractors. This will be deducted from the gross amount of the bills/ invoices.

**Sub-Clause 52.5  
Income Tax on Staff**

The Contractor's staff, personnel and labour will be liable to pay Personal Income Tax in Bhutan in respect of such of their salaries and wages as are chargeable under the laws and regulations for the time being in force, and the Contractor shall perform such duties in regard to such deductions thereof as may be imposed on him by such laws and regulations.

**Clause 53  
Bribes**

If the Contractor, or any of his Subcontractors, agents or servants gives or offers to give to any person any bribe, gift, gratuity or commission as an inducement or reward for doing or forbearing to do any action in relation to the Contract or any other contract with the Employer, or for showing or forbearing to show favor or disfavor to any person in relation to the Contract or to any other contract with the Employer, then the Employer may enter upon the Site and the Works and expel the Contractor and the provisions of Clause 45.4 hereof shall apply as if such entry and expulsion had been made pursuant to that Clause.

**Clause 54  
Termination of  
Contract for Employer's  
Convenience**

54.1 The Employer shall be entitled to terminate this Contract at any time for the Employer's convenience after giving 56 days prior notice to the Contractor, with a copy to the Engineer. In the event of such termination, the Contractor

- a) shall proceed as provided in Sub-Clause 46.2; and
- b) shall be paid by the Employer as provided in Sub-Clause 45.3

54.2 The employer shall have the right at its sole discretion to terminate or cancel the contract in whole or in-part of the following events by giving 30 days prior notice:

- a) If employer deems that the work or a part of the work thereof cannot be completed by the contractor within the period or extended period provided by the contract on account of any reason which is attributable to the contractor.
- b) The contractor, without reasonable excuse has failed to commence the work according to the agreed work schedule specified in the contract.
- c) The contractor is not executing the work in accordance with the orders and/or instructions of BPC and is persistently and flagrantly neglecting to carryout his obligations under the contract, or
- d) The contractor has acted unlawfully in the performance of the contract, or
- e) The contractor has become bankrupt or insolvent.

In the event BPC terminates or cancels the contract in whole or in part, BPC may after giving 14 days prior notice in writing enter the site of the work and the contractor shall not obstruct BPC's action.

In the event BPC shall make entrance or cause the contractor to withdraw from the work site in accordance with the contract, BPC shall have no responsibility under the contract for payment to the contractor until the work is completed and the expenses incurred for completion of the works, the amount of damages for delay in completion and any other expenses borne by BPC have been ascertained.

The contractor shall be obligated to pay to BPC the amount required by BPC or other contractors for additional costs of installation and administration resulting from non-fulfillment of the contract by the contractor and the damages for breach of contract by the contractor.

**Clause 55  
Joint and Several  
Liability**

If the Contractor is a joint venture of two or more persons, all such persons shall be jointly and severally liable to the Employer for the fulfillment of the terms of the Contract and shall designate one of such persons to act as a leader with authority to bind the joint venture. The composition or the constitution of the joint venture shall not be altered without the prior consent of the Employer.

**Clause 56  
Details to be  
Confidential**

The Contractor shall treat the details of the Contract as private and confidential, save insofar as may be necessary for the purposes thereof, and shall not publish or disclose the same or any particulars thereof in any trade or technical paper or elsewhere without the previous consent in writing of the Employer or the Engineer. If any dispute arises as to the necessity of any publication or disclosure for the purpose of the Contract the same shall be referred to the decision of the Employer whose award shall be final.

**Bhutan Power Corporation Limited  
Distribution and Customer Services Department  
Urban Electrification Division  
Thimphu: Bhutan**



**Specification No. BPC/DCSD/UED/C-20**

**Bidding Document**

**For**

**Improvement and Up-gradation of Samdrup  
Jongkhar Town – Phase I**

**Volume I Part-2 – Technical Requirements**

December 2011

**PART - 2**  
**TECHNICAL REQUIREMENTS**  
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Section 2A – Technical Requirement  
(General)

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## **PART 2A - TECHNICAL REQUIREMENTS - GENERAL**

### **1.1 Project Description**

1.1.1 The scope comprises the works for improvement and up gradation of Samdrup Jongkhar Town. A map showing the cable layout and location of substation, distribution and mini pillar is also given in the bid purpose drawing.

1.1.2 This document and specification calls for the manufacture, testing at manufacturer's works, supply and delivery, storage, erection, testing and commissioning of the works required for the Project.

### **1.2 Format of Specification**

This specification describes equipment required in the project summarized in Section 2 B and 2 C:

<b>Brief Description</b>	<b>Major works</b>
Cabling System	Improvement and Up-gradation of Samdrup Jongkhar Town

Any appended drawings of the required equipment /works form part of this specification.

### **1.3 Scope of Work**

The Contract includes the manufacture, testing at manufacturer's works, delivery, storage at site, insurance, erection, testing and commissioning of the Equipment as specified. The Contractor shall be responsible for proper completion of the work till it is formally taken over by the Employer.

The quantities given are estimated quantities. It should be clearly understood that the contract will be on "item rate turnkey basis".

The brief scope of work is as follows:

S1. #	Description of works	Unit	Phase-I
1	11 kV line	Km	2.5
2	LV line	Km	7
3	Service cable	Km	6.9
4	Distribution Pillar	Nos	8
5	Mini Pillar	Nos	40
6	Unitized Substation	Nos	5

Detailed scope of the works is as per the BOQ and specifications of the bidding documents.

### **1.4 Language**

The English language shall be used in all Contract documentation and in all correspondence between the Contractor and the Employer.

## 1.5 Units of Measurement

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

## 1.6 International Standards

All Equipment and the Works under this Specification shall conform to the latest editions of the International Electrotechnical Commission (IEC) or Bureau of Indian Standards (BIS) Specifications.

## 1.7 Site Conditions

### 1.7.1 Elevation

The elevation above sea level of Samdrup Jongkhar town is 203 m.

### 1.7.2 Special Conditions

Particular problems, which shall receive special consideration, relate to operation of the equipment in wide ranging temperatures and the presence of moisture, insects and vermin.

### 1.7.3 Access

Samdrup Jongkhar is accessible from Phuentsholing, Bhutan. Bidders are informed that to visit and work in the project locations, special permits from the Ministry of Home Affairs are required which is required to be processed from Thimphu and Regional Immigration Offices located at Phuentsholing, Gelephu and Samdrupjongkhar. For processing the permits, BPC will provide only assistance and permits need to be processed by contractor themselves. Such cost shall be borne by the contractor and included in the project cost.

## 1.8 Electrical Characteristics

### 1.8.1 Design Features for 11 kV and 415 V Equipment

Nominal system Voltage	11 kV	11 kV	415 V
Location	Outdoor	Indoor	Indoor
Highest system Voltage kV	12	12	415/ 240 <sup>1</sup>
System neutral earthing	Solidly earthed	Solidly earthed	Solidly earthed
Minimum Clearances in air			
a) Between phases - mm	280	120	-
b) Phase to earth - mm	140	120	-
c) Section clearance -mm	2600	2600	-
d) Ground clearance -mm	3700	3700	-

Ph-Ph spacing for Bus-mm	1200	-	-
Insulation levels			
a) 1 minute power frequency kVrms	28	28	2
b) 1.2/50 microsecond impulse kVp	75	75	6
Creepage distance mm	240	N/A	
No. of phases	3	3	3
Frequency Hz	50	50	50
Equipment suitable for short circuit withstand MVA	350 (for 3 sec.)	350 (for 3 sec.)	55kA (for 3 sec.)

<sup>1</sup> 415/240 V no load. 400/230 V on load

The above are the values for 1000 m altitude and shall be corrected based on the elevation for various places for which the equipment shall be designed.

#### 1.8.2 Creepage Distance

The substations are classified as medium pollution level (level II of IEC 60815) with a creepage distance of 20 mm/kV.

#### 1.9 Spare Parts, Tools and Appliances

The bidder shall attach the spares, special tools and/ or appliances which are recommended apart from Schedule "D".

The Employer 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.

## 1.10 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. The cube test for the concrete shall be to the contractor account and tested in the local laboratory for the major concrete works.

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 indicated in clause 1.12 of this section.

### 1.10.2 Surface Coating and Galvanising

All ferrous metalwork shall be provided with an effective galvanized or corrosion resistant paint treatment applied in accordance with the best trade practice.

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

**All the equipment shall be painted with shade RAL 7032 (exterior) and glossy white (interior). Poles shall be painted with silver paint.**

Coatings shall not be applied before Vessels and chambers have passed 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.

Suitable 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 all topcoats shall be approved by the Engineer.

1.11 **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.

1.12 **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 welding shall be carried out by a certified welder who have undergone minimum of certificate level training in this trade.

1.13 **Works Inspections and Testing**

a) **Works Tests**

These are detailed in the technical specifications. The results of all works tests shall be recorded and submitted to the Engineer no later than the date of delivery of ex-works.

b) **Proposed Scope of Inspection**

The Engineer may at the Employer's discretion witness the works tests described in the following Technical Specification and may also make Visits to monitor progress. The Contractor shall give minimum of two weeks notice to the Employer/Engineer with a copy to Engineer, in case they desire to witness the tests, indicating date and place of Inspection.

The test equipment, meters, instruments etc. used for testing shall be calibrated at recognised test laboratories at regular intervals and Valid certificates shall be made available to the Employer's representatives at the time of testing. The calibrating instruments used as standards shall be traceable to Indian/International standards.

c) **Engineer's/Employer's Authority**

Inspection and witnessing of tests shall be carried out in accordance with the Conditions of Contract. The Engineer will be responsible for advising the Contractor of acceptance or rejection. The Inspector has the authority to delay delivery of any items of equipment, which have not been tested and proved in accordance with the Contract.

1.14 **Packing and Shipping**

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.

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 its unpacking and that covered storage may not always be possible.

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.

The Contractor 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.

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

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.

#### 1.15

#### **Cable Drums**

HT cables shall be delivered in the steel cable drums while LT and control cable shall be delivered wound on strong wooden drums treated to an approved International Standard by Vacuum impregnation with copper-chrome-arsenate (CCA) preservative to resist rotting, termite and fungus attacks. Contractor may take back the steel cable drums. However, incase contractor has to handover the HT cables to BPC, the same shall be handed over properly rolled in the steel drums. Drums with an outside diameter exceeding 2.5 metres and an outside width exceeding 1.4 metres shall not be used except with the Engineer's approval. The central hole of the drums shall be reinforced with a steel plate of thickness not less than 10 mm to fit an axle size 95-mm diameter. The interior of the conductor drums shall be lined with bituminous paper to prevent the conductor from being in contact with timber. Waterproof paper and felt lining shall overlap at seams by at least 20 mm and the seams shall be sealed.

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 thread of bolts used to strengthen the cable drums shall be peened in such a way that the nut can be tightened but cannot be readily removed.

1.16 **Labels**

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 permanently attached in a conspicuous position. Where this is not practicable, such labeling shall be provided on packaging to the Engineer's approval.

Labels shall be made of non-rusting metal or 3-ply lamicaid. Labels shall have white letters on black or dark blue background. The lettering size shall be 6 mm for panel designation and minimum 3 mm for device labels. The label inscriptions shall be subject to the Employer's approval.

1.17 **Locks**

Provision shall be made for the locking of mechanism boxes, indoor and outdoor equipment to limit access or for the safety of personnel. The locks shall be rust proof and shall be provided as a part of the equipment.

1.18 **Quality Assurance**

The Bidder shall submit in the tender an outline of the quality assurance practices that will be applied to all aspects of the manufacturing process.

Within one month of receipt of a letter of acceptance (LOA) under this for equipment specification and civil works, the Contractor shall submit a detailed Quality Assurance Manual, which conforms generally to the requirements of ISO 9002. Approval to proceed with manufacture of equipment within this Contract will not be given until this Quality Assurance Manual has been received and approved by the Engineer. Delays to the Contract completion date due to non-compliance with this specification requirement will be the Contractor's responsibility.

Major features of the Quality Assurance Scheme practiced by the Contractor and detailed in his Quality Assurance Manual shall be:

- a) The Contractor has defined all staff responsibilities and the QA systems operating within the organisation for the purpose of ensuring adequate quality of the end product.
- b) The Contractor has a senior officer with the authority to resolve matters of quality to the satisfaction of the Engineer.
- c) The Contractor has adequate facilities under the control of properly trained staff to perform the quality control duties.

- d) All production operations and test functions are properly documented and available to any relevant member of the Contractor's workforce.
- e) A detailed inspection and test plan is prepared for the whole manufacturing operation.
- f) Regular and systematic programs of testing are carried out for all incoming raw materials.
- g) Regular calibration checks are carried out on all measuring equipment used in the manufacturing operations.
- h) Statistical analyses are carried out regularly on appropriate test results to confirm that all processes are performing within the specified tolerances.
- i) Adequate procedures are planned for corrective action in the event that quality checks show that performance is not satisfactory.
- j) All checking activities, test results etc. are recorded on appropriate standardised forms and these are verified, certified, recorded and filed in a systematic manner.

## 1.19 **Site Services**

### 1.19.1 **Living Accommodation**

The Contractor has to make his own arrangements with regard to accommodation for his expatriate/local staff during the supervision of erection. No construction for temporary accommodation will be allowed within the substation area.

All dwellings and buildings existing or erected for any purpose by the Contractor shall comply with local regulations in regard to construction, water supply, sanitation and other requirements. The Contractor is responsible for seeking approval from concerned authority whenever required to take up infrastructure works like construction of site office, labour camps, site stores, etc. Temporary construction camps are to be provided with proper sanitation and other necessary facilities. All temporary accommodation shall be removed by the Contractor when no longer required and before the granting of the Final Certificate. After the removal of accommodation the ground shall be left in a clean and tidy condition.

### 1.19.2 **Office Accommodation**

The Contractor is to bear all expenses in connection with their office accommodation, accommodation of the staffs, temporary housing and things needed for the purpose of the Contract. The Contractor is also to provide temporary site office minimum 16 sq.m together with one table with lockable drawer, three chairs (plastic) with toilet and water facilities for BPC site supervisor engaged for construction, supervision of the Works and the cost of these shall be deemed to be included in the Contract Price.

### 1.19.3 **Medical Facilities**

The Employer will not provide these and the Contractor shall make his own arrangements where these services may be required for his staff.

1.19.4 Labour Work Permits, Accommodation and Insurance

It will be the responsibility of the Contractor to ensure that all grades of expatriate labour have the current and correct work permits and or Visas, and to comply in every way with the immigration and or emigration regulations. The contractor shall also ensure that they comply with the labour laws of the country and the requirements for leave, accommodation and insurance of all his employees and the employees of his sub-contractors. The Contractor in all dealings with labour in his employ shall have due regard to all recognised festival days of rest and religious or other customs.

1.19.5 Transport to Site

The Contractor is to bear all expenses in connection with the transport to Site of all plant, material and things needed for the purpose of the Contract including warehouse rent, handling and other charges, which may occur. The Contractor is to observe any regulations, which limit loads on roads and bridges over which material may be conveyed.

1.19.6 Plant Handling and Storage

The handling and storage of any plant at the Site will be the responsibility of the Contractor. The Contractor shall arrange for suitable lay-down areas. The Contractor is to advise on the protection of all material against corrosion, theft, and mechanical damage during storage and erection at the Site.

Only galvanised structural steelwork may be stored in the open. Plant sensitive to climatic conditions must be stored in closed buildings protected from dust and humidity.

1.19.7 Access

The Contractor will be responsible for the construction and maintenance of any temporary roads. When haulage or construction roads are no longer required the Contractor shall break up hardened surfaces, remove all imported material, and shall reinstate the original surface and topsoil of the disturbed areas to a natural condition.

1.19.8 Site Sanitation

The Contractor shall ensure that every construction site is maintained in a clean and sanitary condition. The Contractor shall provide refuse collection and disposal services including sweeping of paved streets and cleaning of drainage channels. Adequate mobile or other toilets shall be provided at the work sites controlled by the Contractor. The Contractor shall ensure that such toilets remain in a hygienic condition.

1.19.9 Construction Power Supply

Contractor shall make his own arrangements for construction power supply and pay the requisite charges/fees to the BPC.

1.19.10 Lighting and Power

All power and lighting circuits shall be constructed with due regard for personnel safety and shall comply with recognised codes of practice and local regulations. All circuits shall be fitted with earth leakage systems.

1.19.11 Spoil Areas

Disposal areas for equipment foundation spoil shall be determined by mutual agreement with the Engineer, the Employer, land owners, and local authorities. It shall be the responsibility of the Contractor to ensure that spoil does not negatively impact the natural beauty, the function or ecosystems of the area. It will be the responsibility of the contractor to properly dispose off excavated soil at the designated place by the municipal corporations.

1.20 **Contractor's Responsibility**

1.20.1 Safety of Personnel

The Contractor shall afford maximum safety to personnel directly engaged on this Contract or to persons who, in the normal course of their occupation, find it necessary to utilise temporary works erected and to frequent the working area. Additional safety regulations to be followed by the Contractor at site are attached with the specifications.

Once any section of the plant has been made alive; the Contractor, the Engineer and the Employer shall establish and agree to a system for ensuring the safety of personnel and equipment. While the plant is under the control of the Contractor, the Contractor shall be primarily responsible for the safety precautions.

It will be mandatory under this contract to provide at least safety helmets and gumboots to all the personnel working at the site.

1.20.2 Contractor's Employees

The Contractor shall provide adequate transportation, accommodation, boarding and medical facilities for all personnel in his employ. He is also to comply with the requirements of all relevant Labour Laws of Bhutan.

The Contractor shall be responsible for the behavior on site of all personnel employed by him.

1.20.3 Training of Local Staff

The Contract shall include for the training of the Employer's employees in the areas corresponding to testing and commissioning of UG cables.

1.20.4 Progress Reports

At monthly intervals, the Contractor shall submit to the Engineer detailed progress reports (in triplicate) in an approved form indicating the stage reached in the design, ordering of material, manufacture, delivery and supervision of erection of all components of plant. All variances from the agreed schedule are to be promptly reported. These reports shall be forwarded promptly so that, on receipt by the Engineer, the information contained therein is not more than seven days out of date. One copy shall also be forwarded to the Engineer's representative on Site. These reports shall be prepared using project management software like Microsoft Project. The soft copies of the report shall also be supplied to the Engineer/ Employer.

The Contractor shall submit to the Engineer a weekly return detailing for each portion of the works separately, the numbers of the various classes of workmen employed by him on the Site, the Contractor's equipment on site, or any other information that may reasonably be required.

Access to the Contractor's and Sub-contractor's works shall be granted to the Engineer and Employer at all reasonable times for the purpose of ascertaining progress.

1.20.5 Progress Review Meetings (PRM)

The Contractor shall attend regular formal site progress review meetings with the Engineer where progress and construction-related issues will be reviewed. The Contractor shall prepare for issue the day before the meeting, detailed schedules showing separately the erection, fixing, concreting, commissioning, or other work activities planned for the next two weeks as well as progress achieved over the preceding week.

The Contractor shall also be required to attend other meetings from time to time as required for the project and the person representing the contractor shall be fully empowered to take decisions at such meetings.

1.20.6 Relations with Local Residents and Authorities

The Contractor shall liaise with local authorities on matters concerning the impact of his operations on the local communities. Any problems that cannot be resolved by the Contractor shall be referred to the Employer through the Engineer.

1.20.7 Public Relations

The Contractor shall not publish or provide any information relating to progress or financial status of the works to any person or organisation without the prior consent of the Employer.

1.20.8 Environmental Considerations

The Contractor shall ensure that construction does not negatively impact the natural beauty, the function, the amenities, or the ecosystems of the area and care shall be taken to prevent permanent damage.

All rivers and streams shall be protected from direct or indirect spills of pollutants resulting from the Contractor's activities.

The Contractor shall provide drainage facilities at each substation site, and shall revegetate the surface where necessary to prevent erosion and consequent weakening of the foundations.

The Contractor shall as far as possible, protect the flora within the work sites. If areas are disturbed beyond the designated work boundaries, the Contractor shall reinstate the ground and re-establish suitable Vegetation as directed by the Engineer at no extra cost to the Employer. Such re-establishment shall take place as soon as practicable after the Engineer's request.

The Contractor and his employees shall protect all faunas living within the site area and shall ensure that hunting, shooting, bird nesting, egg collecting, or trapping does not occur. Permits to cut any trees shall be obtained from the relevant authorities through the Employer.

The Contractor shall as far as possible, restrict the dust pollution due to digging activities. Special care shall be taken to reduce the pollution by spraying water at regular intervals as per the directives of engineer or supervisor so that the effects of dusts and inconvenience to the public are minimized.

The contractor shall not dig and leave the place open for a maximum period of 7 days. The cable laying and foundation etc shall be so planned that as soon as digging is done the work is carried out and covered up. As a safety measure, the Contractor shall also barricade the working area with the warning tapes and bamboos.

Contractor shall mobilize the workforce, equipment and start the work only after getting environmental clearance from National Environment Commission. BPC shall process for these clearances and hand over to the contractor at as early as possible after signing of the contract agreement.

The work site shall be kept neat and clean at all the times. Proper house keeping of the site and store shall be done as directed by the engineer in charge as per the directives at the site without any extra cost to the employer.

1.21 **Documentation**

1.21.1 **General**

In addition to the documentation requirements set out in the Conditions of Particular Application, the Contractor shall provide the information requested below.

*Unless otherwise specified, 3 (three) copies of every item of submission shall be submitted by the Contractor.*

1.21.2 The essential drawings and information shall be submitted for approval after signing of the contract agreement before the work is put in hand.

1.21.3 Following drawings shall be enclosed with the bid:

- a) The program in the form of a network based on the principles of PERT/CPM, detailed to cover entire scope of the project showing all

activities, their duration, start and finish dates and their inter-relationships and major milestones.

#### 1.21.4 As-Built Drawings on Completion of the Works

Prior to the issue of the Taking-Over Certificate, the Contractor shall submit four copies (one reproducible and four copies) of complete sets of As-Built drawings to the Engineer/ Employer for each item of plant as per section 2 E. Soft copies of all as-built drawings in Auto Cad shall also be submitted. This shall also be the condition for the issuance of the taking over certificate.

#### 1.21.5 Test and Inspection Documents

The Contractor shall submit to the Engineer for approval a summary table of tests and inspections to be carried out in the manufacturer's works and at site at least 2 months before the first scheduled activity.

The schedule shall include:

- Raw materials test and inspections;
- Workshop tests and inspections;
- Site tests and an inspection, including pre-commissioning and commissioning tests.

The Contractor shall submit detailed procedures for the site tests for approval at least one month in advance of the corresponding activities, including:

- Descriptions of the inspection and test methods;
- Test or inspection sheets with dimensions and blank spaces for entering of measured values;
- Proposed dates and locations of tests and inspections.

The Contractor shall submit all final test and inspection reports to the Engineer for approval, in the case of manufacturer's works activities, before shipment of the corresponding plant items.

#### 1.21.6 Dispatch Documents

The Contractor shall supply consignment notes bearing the reference number of each dispatch, and a list of the contents of each crate, identification numbers, dimensions, net and gross weights and where necessary, any special instructions regarding storage and the type of packaging/ handling.

#### 1.22.1 Applicability of the requirement

The general specification and requirement shall be applicable to all the equipment and work under the contract. The equipment manufactured shall be in compliance with the general specification and detailed technical specification.

### 1.23 **Type Tests**

All equipment/materials shall conform to type tests including routine acceptance and additional tests in accordance with the relevant Standards and Codes. The Bidder shall submit copies of type test for each equipment during detail engineering. The type tests report submitted shall be of the tests conducted within the last five (5) years prior to the date of Bid opening. In case the type tests reports are of the tests conducted earlier than five (5) years prior to the date of Bid opening, the Contractor shall repeat these test(s) at his cost.

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## Section 2B – Technical Specifications (Electrical)

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## 1.0 Power and Control Cables

### 1.1 Scope

This specification covers the design, manufacturing, testing and manufacture work before dispatch and transportation to site required as per the Bill of Quantities.

### 1.2 Standards

The cable supplied shall conform to the latest edition of the appropriate IEC Specifications and/or other recognized international standards. In particular:

- |       |                       |  |
|-------|-----------------------|--|
| i.    | IS 7098 (part I & II) | XLPE insulated cables.   |
| ii.   | IS 1554 (Part I)      | PVC insulated (Heavy duty) electric cables for working voltage up to and including 1100 V. |
| iii.  | IS: 3961              | Recommended current ratings for cables.  |
| iv.   | IS: 8130              | conductors for insulated electric cables and flexible chords.                              |
| v.    | IS: 5381              | PVC insulation and sheath of electric cables.  |
| vi.   | IS: 1753              | Aluminium conductors for insulated cables.   |
| vii.  | IS: 2982              | Copper conductors in insulated cables and cords.   |
| viii. | IS: 3075              | Mild steel wires strips and tapes for armouring cables.                                    |
| ix.   | IS: 1048              | Drums of electric cables.  |

### 1.3 Technical Specifications

- 1.3.1 The cables shall be suitable for laying in racks, ducts covered trenches, conduits and underground buried installation.
- 1.3.2 The aluminium or copper wires used for manufacturing shall be true circular shape before standing and shall be uniformly good quality free from defects. All aluminium used in the cables shall be H2 grade.
- 1.3.3 The fillers and inner sheath shall be of non-hygroscopic flame retardant material shall be suitable for the operation temperature of cable.
- 1.3.4 Suitable chemicals shall be added to the outer sheaths of all cables to protect them from rodent and termite attack. These chemicals shall not have any harmful effect on human being.
- 1.3.5 The normal current rating of all PVC insulated cables shall be as per IS – 3961 and should suit the duty requirements for which it is insulated.
- 1.3.6 The XLPE insulated cables shall be capable of withstanding a conductor temperature of 250 degree centigrade during short circuit and PVC insulated

cables shall be able to withstand a temperature of 160 degree centigrade during short circuit.

1.3.7 Allowable diameter on the overall diameter of cables shall be + 2 mm.

#### 1.4 Construction

##### 1.4.1 11 KV Power Cables (Cross Linked Polyethylene Insulated Cables)

1.4.1.1 Conductor – Well compacted aluminium circular shape.

1.4.1.2 Conductor shield – This shall be cross-linked. The resistivity of semi-conducting materials shall not exceed 100000 to 1000000 ohm cm in the radial direction.

1.4.1.3 Insulation shield – This shall be preferably be of strippable triple extruded thermoset type.

1.4.1.4 Armour – Single galvanised wire armour may be provided when specified.

1.4.1.5 Serving – The cable serving should protect the cable sheath and armour from electrolysis caused by stray current, from galvanic action, from corrosion and microbiological attack.

##### 1.4.2 400 V Power Cables (PVC Insulated Cables)

1.4.2.1 The PVC compound used for insulation shall have reduced flame propagation property. This shall also have reduced emission of hydrogen chloride gas fumes when severely overheated during fires.

1.4.2.1 PVC armoured power cable stranded (Type-A) shaped aluminium conductor, PVC insulated colour laid up, inner sheathed or wrapped thermoplastic tape, galvanised flat steel stripe armoured and PVC (Type-ST1) sheathed overall 1100 volts with IS-1554 (Part-1) 1998.

##### 1.4.3 Control cables

1.4.3.1 The 1100 V grade control cables shall conform to IS 1554 (Part I) as amended. The conductor shall be composed of solid high conductivity copper. The insulation shall be extruded PVC of type A of IS: 5831. The inner and outer sheath shall be extruded PVC of type A of IS: 5381. The inner sheath and outer sheath shall be extruded PVC type ST-1 IS: 5831 and shall be grey in colour where specifically advised by the employer.

1.4.3.2 Cores shall be identified as per IS: 1554 (part I) for cables up to five (5) cores. For cables with with more than five (5), the identification shall be done by printing legible alphabets on all cores. The alphabets shall be white and be printed at about 100 mm interval all along the cable length. Cables without such core identification will not be accepted.

## 1.5 Cable Drums

The cables shall be delivered wound on strong wooden drums treated to an approved international standard by vacuum impregnation with copper chrome arsenate (CCA) preservative to resist rotting and termite and fungus attacks. The drum should be strong enough to cables against all damage during transit, storage and secured with the help of U nails or bolts on the side of the flanges to avoid loosening of the conductors during transit.

Each drum must have the following information stencilled on it in permanent ink:

- i. Bid/Specification no.
- ii. Name and address of consignee
- iii. Makers name & address
- iv. Drum no.
- v. Size and length of cable in meters
- vi. Gross weight of drum including conductors
- vii. Weight of empty drum
- viii. Net weight of cable
- ix. Arrow marking for un-winding position of the conductor end and lot no.

Further the cable length and name of Bhutan Power Corporation may be marked on the Power Cable Drum.

## 1.6 Inspection & Testing

The materials will be inspected at the manufacturer's works by the respective appointed by the Bhutan Power Corporation. The tests shall be performed in accordance with the relevant IEC standards, in the absence of the IEC recommendations, the tests must be equivalent at least to the conditions, provisions and definitions of the above mentioned standards.

1.6.1 The test will divided into the following categories:

1.6.1.1 Routine Tests: (to be performed on each drum length)

- i. D.C resistance measurements as per IEC 141 – 1
- ii. Capacitance as per IEC 141 – 1
- iii. Partial discharge measurement at power frequency
- iv. High voltage test at 2.5 times the rated voltage at power frequency
- v. Power factor measurement
- vi. Thickness of the extruded sheath
- vii. Insulation resistance of cores
- viii. Tests on serving
- ix. Tensile strength & elongation at break for insulation and sheath
- x. Hot test for insulation
- xi. Wrapping test for all
- xii. Tensile test for all
- xiii. Annealing test for copper

1.6.1.2

Type Tests

The bidders shall include with their offers type test certificates, issued by an approved, reputable, independent testing laboratory. In addition, the Division of Power may call for type test to be carried out at the manufacturer’s work witnessed by the inspecting engineers. Such test would be on random samples at the discretion of the Division of Power and failure to meet the condition of test could result in the complete rejection of the cables. The test if carried out will compromise of the following:

- i. Partial discharge test
- ii. Loading cycle test
- iii. Mechanical test and hot impulse voltage test
- iv. Saline bath test
- v. Power factor/temperature test
- vi. Dielectric security test

The changes for conducting each of the type tests shall be indicated separately for each type & size of cables. The owner at his discretion may ask the bidder to conduct any or all type tests shall be paid accordingly.

1.7

Technical Particulars for Cables

S1. #	Description	Unit	Specified
1	<b>6.35/11 KV XLPE Three Core 300 sq.mm Armoured Cables with Aluminium Conductor</b>		
a	Nominal area of conductor	Sq. mm	300
b	Nominal thickness of insulation	mm	3.6
c	Minimum thickness of inner sheath	mm	0.7
d	Nominal dimension of flat strip	mm	4X0.8
e	Minimum thickness of outer sheath	mm	2.68
f	Approximate overall diameter of cable	mm	74
g	Approximate weight of finished cable	Kg/Km	6520
h	Normal delivery length	m	500
i	Maximum DC resistance at operating temperature 20 deg. C	Ohms/Km	0.1
j	Approximate AC resistance at operating temperature 90 deg. C	Ohms/Km	0.13
k	Approximate reactance at 50 Hz	Ohms/Km	0.071
l	Approximate capacitance	Mfd/Km	0.5
m	Current rating – direct in ground 30 deg. C	amps	375
n	Current rating – in air 40 deg. C	amps	450
o	Short circuit rating for one second	KA (rms)	28.2

2	<b>1100 V PVC Insulated PVC Sheathed, 4 Core 240 sq.mm Steel Armoured Cables with Aluminium Conductor</b>		
a	Conductor (Al) minimum no of wires		30
b	Nominal thickness of PVC insulation	mm	2.2
c	Thickness of common wrapped covering	mm	0.6
d	Nominal dimension of flat strips	mm	4X0.8
e	Minimum thickness of outer PVC sheath	mm	2.2
f	Approximate overall diameter of cable	mm	57
g	Approximate weight of finished cable	Kg/Km	4840
h	Normal delivery length	m	500
i	Maximum DC resistance at operating temperature 20 deg. C	Ohms/Km	0.125
j	Approximate AC resistance at operating temperature 70 deg. C	Ohms/Km	0.15
k	Approximate reactance at 50 Hz	Ohms/Km	0.087
l	Approximate capacitance	Mfd/Km	0.82
m	Current rating – direct in ground	amps	275
n	Current rating – in air 30 deg. C	amps	280
o	Short circuit rating for one second	KA (rms)	18.2

3	<b>1100 V PVC Insulated PVC Sheathed, 4 Core 150 sq.mm Steel Armoured Cables with Aluminium Conductor</b>		
a	Conductor (Al) minimum no of wires		18
b	Nominal thickness of PVC insulation	mm	1.8
c	Thickness of common wrapped covering	mm	0.5
d	Nominal dimension of flat strips	mm	4X0.8
e	Minimum thickness of outer PVC sheath	mm	1.88
f	Approximate overall diameter of cable	mm	48
g	Approximate weight of finished cable	Kg/Km	7086
h	Normal delivery length	m	500
i	Maximum DC resistance at operating temperature 20 deg. C	Ohms/Km	0.124
j	Approximate AC resistance at operating temperature 70 deg. C	Ohms/Km	0.149
k	Approximate reactance at 50 Hz	Ohms/Km	0.087
l	Approximate capacitance	Mfd/Km	1.31
m	Current rating – direct in ground	amps	270
n	Current rating – in air 30 deg. C	amps	265
o	Short circuit rating for one second	KA (rms)	11.40

4	<b>1100 V PVC Insulated PVC Sheathed, 4 Core 95 sq.mm Steel Armoured Cables with Aluminium Conductor</b>		
a	Conductor (Al) minimum no of wires		15

b	Nominal thickness of PVC insulation	mm	1.6
c	Thickness of common wrapped covering	mm	0.4
d	Nominal dimension of flat strips	mm	4X0.8
e	Minimum thickness of outer PVC sheath	mm	1.72
f	Approximate overall diameter of cable	mm	40
g	Approximate weight of finished cable	Kg/Km	4806
h	Normal delivery length	m	500
i	Maximum DC resistance at operating temperature 20 deg. C	Ohms/Km	0.193
j	Approximate AC resistance at operating temperature 70 deg. C	Ohms/Km	0.231
k	Approximate reactance at 50 Hz	Ohms/Km	0.09
l	Approximate capacitance	Mfd/Km	1.2
m	Current rating – direct in ground	amps	210
n	Current rating – in air 30 deg. C	amps	200
o	Short circuit rating for one second	KA (rms)	7.22

5	<b>1100 V PVC Insulated PVC Sheathed, 4 Core 35 sq.mm Steel Armoured Cables with Aluminium Conductor</b>		
a	Conductor (Al) minimum no of wires		6
b	Nominal thickness of PVC insulation	mm	1.2
c	Thickness of common wrapped covering	mm	0.3
d	Nominal dimension of flat strips	mm	4X0.8
e	Minimum thickness of outer PVC sheath	mm	1.4
f	Approximate overall diameter of cable	mm	27.5
g	Approximate weight of finished cable	Kg/Km	2105
h	Normal delivery length	m	500
i	Maximum DC resistance at operating temperature 20 deg. C	Ohms/Km	0.524
j	Approximate AC resistance at operating temperature 70 deg. C	Ohms/Km	0.627
k	Approximate reactance at 50 Hz	Ohms/Km	0.097
l	Approximate capacitance	Mfd/Km	0.98
m	Current rating – direct in ground	amps	120
n	Current rating – in air 30 deg. C	amps	110
o	Short circuit rating for one second	KA (rms)	2.66

## 2.0 Power and Control Cable Terminations

2.1 Terminals for power connections shall be complete with adequate phase segregating insulating barriers, shrouds and suitable crimping type of lugs for terminating the cables.

2.2 Double compression type glands with armour and bonding clamps for the termination of all solid dielectric shall be provided. They shall be designed to secure the armour wires 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 preferably project above the gland plate to avoid entry of moisture.

2.3 Earthing connectors between cable armour and earth shall be routed outside the cable gland in an approved manner. Gland insulation shall be capable of withstanding test for appropriate high voltage for one minute.

2.4 Cable terminations and jointing for HV/LV cables shall be carried out with heat shrinkable type termination kits. Adequately sized shrouds/bolts shall be provided at connections to completely cover the terminations.

### **3.0 LT Distribution Panel, Distribution Pillars and Mini Distribution Pillars**

#### **3.1 Standards**

The A.C distribution panel & pillars with their accessories shall confirm to the latest edition of the following standards as mentioned below (amended up to date) except where specified otherwise in this specification.

- |       |          |   |
|-------|----------|---|
| i.    | IS: 8623 | Specification for factory built assemblies of switch gear control gear for voltage upto and including 1000V AC and 1200V DC |
| ii.   | IS: 4237 | General requirements for switchgear and control gear for voltage not exceeding 1000V.                                       |
| iii.  | IS: 3147 | Degree of protection provided by enclosures for low voltage switchgear and control gear.                                    |
| iv.   | IS: 2516 | Air circuit breaker   |
| v.    | IS: 3156 | Voltage Transformer   |
| vi.   | IS: 2705 | Current Transformer   |
| vii.  | IS: 3231 | Electrical relays   |
| viii. | IS: 4064 | Air Break Switches  |
| ix.   | IS: 9224 | Low Voltage fuses   |
| x.    | IS: 6875 | Switch and push buttons   |
| xi.   | IS: 722  | AC meters   |
| xii.  | IS: 6005 | Code of Practice for phosphating of iron and steel  |
| xiii. | IS: 1248 | Measuring Instruments   |
| xiv.  | IS: 2633 | Hot dip galvanizing   |
| xv.   | IS: 375  | Marking arrangement of bus bars   |

#### **3.2 Drawings**

3.2.1 The bidder shall be required to furnish following and catalogues along with the bid

- i. General arrangement drawing of AC Distribution panel
- ii. Cal schematic diagram of AC distribution pillars.
- iii. Technical and descriptive literature giving details of the equipment offered.

3.2.2 After receipt of the order, the successful bidder will be required to furnish six prints of the following drawing for approval.

- i. Complete assembly drawings of AC distribution panel/pillars showing plan,

- ii. elevation, sectional views and location of terminal blocks, cable entry details. Control and wiring diagram for each module of AC distribution panel/pillars including all spare terminals and inter modulars.
- iii. Foundation plan showing location channels, nails, foundation bolts etc.
- iv. Schematic Control diagram for control interlocks, relays, instruments and space heaters for each type of module.
- v. Protective relay characteristics for each type of relay.
- vi. Fuse characteristic curve for each type and rating.

### 3.3 General Requirements

- 3.3.1 LV Distribution panels and mini pillars shall be of metal clad, totally enclosed, indoor floor-mounted, free-standing cubicle type.

The distribution pillar should be designed for outdoor installation and have a short circuit rating of 35 KA for 3 second. It should be designed for termination of all cables from the front. Also operation of all fuse-switches and links should be from front only. It should have minimum 350 mm. clearance from lower most termination to the cable clamp. Each board shall be complete with terminal boards, interlocking gears, screens, guards and other necessary sundries whether specified or not. The cable entry shall be from the bottom.

The design/layout of the Distribution pillar/mini pillars should be compact/convenient and should provide ease of termination of cables and operation. The design/layout shall be subjected to approval of BPC.

- 3.3.2 All distribution panels, Distribution pillars & mini pillars frames shall be fabricated using suitable mild steel structural sections or pressed ad shaped and shaped cold-rolled sheet of thickness not less than 2.5 mm. frames shall be enclosed in cold-rolled sheet steel of thickness not less than 2.5 mm. doors and covers shall also be cold-rolled sheet steel of thickness not less than 2.5 mm. stiffeners shall be provided wherever necessary.
- 3.3.3 All panels edges and cover/door edges shall be reinforced against distortion by rolling bending or by the addition of welded reinforcement member.
- 3.3.4 The complete structures shall be rigid, self supporting, free from flaws, twists and bends. All cut-out shall be true in shape and devoid of sharp edges.
- 3.3.5 All LT Distribution panel for indoor use shall be of dust vermin proof construction and shall be provided with a degree of protection of IP-52 as per IS: 2147. However, the bus bar chamber having a degree of protection of IP-42 in accordance with IS: 2147 are also acceptable. Provision shall be made in all compartments for providing IP-52. Degree of protection when circuit breakers of module trolley has been removed. All cut-outs shall be provided with neoprene/synthesis rubber gaskets. However, all pillars for outdoor installation shall have IP-54 degree of protection (minimum).
- 3.3.6 Distribution panels shall be of a uniform height not exceeding 2300 mm.

- 3.3.7 Distribution panels shall be easily extendable on both sides, by the addition of the vertical sections after removing the end covers.
- 3.3.8 After isolation of power and control circuit connections, it shall be possible to safely carry out maintenance in a compartment with the bus bar and adjacent circuits live. Necessary shrouding arrangement shall be provided for this purpose over the cable terminations located in cable alley.
- The minimum clearance in air between phases and between bus to earth for the entire run of horizon and vertical busbars shall be 25 mm. for all other components, the clearance between “two live parts”, “A live part and earth part” and isolating distance shall be at least ten(10) mm throughout. Wherever it is not possible to maintain this clearance, insulation shall be provided by sleeving or barriers. However, for horizontal run of busbar minimum clearance of 25 mm should be maintained even if they are sleeved.
- 3.3.9 The temperature rise of horizontal and vertical busbars when carrying the rated current along its full run shall in no case exceed 55 degree C, with silver plated joints and 40 degree C with all other type of joints over an outside ambient temperature specified in section general.
- 3.3.10 Distribution panel/pillars shall be single front and shall be provided with openable covers at front and rear. The covers shall be provided with danger labels and locking arrangement.
- 3.3.11 All identical circuit breakers and module chassis of same size shall be fully interchangeable without having any carryout modifications.
- 3.3.12 All identical circuit breakers shall be fixed type except air circuit breaker modules.
- 3.3.13 All equipment and components shall be neatly arranged and shall be easily accessible for operation and maintenance. The internal layout of all modules shall be subjected to BPC approval.
- 3.3.14 LV Distribution pillar and mini pillars shall be attached at the base to frame with 4 legs of suitable size made from MS angle 60X60X6 mm. the height of legs (MS angle 60X60X6) shall be adjusted according to the site requirements and it shall be 600 mm above the ground level.
- 3.3.15 The LV distribution pillar shall be of type types.
- a) Type A shall be with 1 number of 800 Amps MCCB (source) and 5 numbers 250 Amps MCCB.
- b) Type B shall be provided with 2 numbers 800 Amps MCCB (source side) and 5 numbers 250 Amps MCCB.

The detail of the distribution will be discussed during drawing approval.

#### 3.4 Busbars and Isolators

- 3.4.1 All parts of the pillars including busbars, connections, isolators, fuses, contacts and terminals shall comply, with regard to rating, temperature rise and

overload, with the appropriate requirements and shall be capable of operating continuously with injurious heating at full rated output. All conductors, connections and contacts shall be ample section and surface area for carrying the specified short circuit current for the specified time to enable the supply fuse or circuit breaker clears the fault.

3.4.2 The AC Distribution panel/pillar shall be provided with three phase and a neutral copper bus bars.

3.4.3 All bus bars and jumper connections shall be of high conductivity copper of adequate size. The busbars shall be rated for 800 amps for distribution pillar and 400 amps for mini pillar for continuous.

3.4.4 The cross section of the bus bar shall be uniform and shall be adequately supported and braced to withstand the stresses due to the specified short circuit current.

All bus shall be adequately supported by non-hygroscopic, non-combustible, track-resistant and high strength type polyester fibre glass molded insulators. Separate supports shall be provided for each phase and neutral bus bars. If a common support is provided anti-tracking barriers shall be provided between the supports.

3.4.5 All bus bars joints shall be provided with high tensile steel bolts/spring washers and nuts, so as to ensure good contacts at the joints. Non-silver plated bus bar joints shall be thoroughly cleaned at joint locations and suitable contact grease shall be applied just before making a joint.

3.4.6 All bus bars shall be color coded as per IS: 375

3.4.7 The bidder shall furnish calculations along with the bid establishing the adequacy of bus bar sizes for specified current ratings.

### 3.5 Earth Bus

3.5.1 A copper earthing bus shall be provided at the bottom of each panel and shall extend throughout the length of each Distribution panel. It shall be welded/bolted to the frame work of each panel and breaker earthing contact point. Vertical earth bus shall be provided in each vertical section, which in turn is bolted/welded to main horizontal ground bus.

3.5.2 The earth bus shall have sufficient cross-section to carry the momentary short circuit and short circuit time fault current to earth without exceeding the allowable temperature rise.

3.5.3 Suitable arrangement shall be provided at each end of the horizontal earth bus for bolting to substation earthing conductors. The horizontal earth bus shall project outside the Distribution panel/pillar ends and shall have predrilled holes for this connection. All joints to earth bus shall be made through at least two bolts.

- 3.5.4 All non-current metalwork of the Distribution panel/pillar shall be effectively bounded to the earth bus. Electrical conductivity to the whole switch gear enclosures frames work and the truck shall be maintained even after painting.
- 3.5.5 The truck and their circuit breaker frame shall get earthed while the truck is being inserted in the panel and positive earthing of truck and breaker frame shall be maintained in all positions i.e. “service” & “isolated” as well as throughout the intermediate level.
- 3.5.6 All the metallic cases of relays, instruments and other panel mounted equipment’s shall be connected to earth bus by independent standard copper wires of size not less than 2.5 sq.mm. Insulation color code of earthing wires shall be green. Earthing wires shall be connected to terminals with suitable clamp connectors. Soldering is not acceptable. Looping of earth connection which would result in loss of earth connection to other devices when a device is removed is not acceptable. However, looping of earth connections between equipment to provide alternative paths or earth bus is acceptable. VT and CT secondary neutral point earthing shall be at one place only on the terminal block. Such earthing shall be made links so that earthing of one secondary circuit shall be removed without disturbing the earthing of other circuit.
- 3.5.7 All hinged doors shall be earthed through flexible earthing braid.
- 3.5.8 Caution nameplate “Caution – Live Terminals” shall be provided at all points where the terminals are likely to remain live and isolation is possible only at remote end.
- 3.6 Molded Case Circuit Breakers (MCCB)
- 3.6.1 MCCB shall in general conform to IS: 2516
- 3.6.2 MCCB shall be flush mounted on the AC Distribution panels/pillars.
- 3.6.3 MCCB shall be provided with thermomagnetic type release for over current and short circuit protection. The setting of the thermal releases setting shall be between 75% to 100% of the rated current. The magnetic releases setting shall be adjustable between 300% to 600% of the thermal release setting at site.
- 3.6.4 MCCB shall also be provided with under voltage release.
- 3.6.5 MCCB shall be manually operated. The operating handle should give a clear trip indication.
- 3.7 Instruments
- 3.7.1 Indicating and integrating meters shall be flush mounted on panel front. The instruments shall be of at least of 96 mm square size with 90 degree scales, and shall have an accuracy class of 1.5 or better. The covers and cases of instruments and meters shall provide a dust and vermin proof construction.
- 3.7.2 All instruments shall be compensated for temperature errors and factory calibrated to directly read the primary quantities.

3.7.3 All instruments shall have white dials with black numerals and lettering. Black knife-edge pointer with parallax free dials will be preferred.

3.7.4 The following indicating instruments shall be provided in LV Distribution pillar 1 No. Ammeter & 1No. Voltmeter with selector switches to read all three phases.

### 3.8 Push Buttons

3.8.1 Push-buttons shall be of spring return, push to actuate type. Their contacts shall be rated to make, continuously carry and break 10 A at 240 AC.

3.8.2 All push-buttons shall have one normally open and one normally closed contact, unless specified otherwise. The contact faces shall be of silver or silver alloy.

3.8.3 All push-buttons shall be provided with integral escutcheon plates marked with its functions.

3.8.4 The color of the button shall be as follows:

Red:	Breaker Close
Green:	Breaker Open
Black:	For overload reset

### 3.9 Indicating Lamps

3.9.1 Indicating lamps shall be of the panel mounting filament type and low watt consumption. Lamps shall be provided with series resistors, preferably built-in the lamps assembly. The lamps shall have escutcheon plates marked with its function, wherever necessary.

3.9.2 Bulb and lamp covers shall be easily replaceable from the front of the cubicle.

### 3.10 name Plate and Labels

3.10.1 All switchgears, Distribution pillars shall be provided with prominent, engraved identification plates. The module identification plate shall clearly give the feeder number and the feeder designation. For single front switchboards, similar panel and board identification labels shall provided at the near side.

3.10.2 All name plates shall be of non-rusting metal or 3-ply lamcoid with white engraved lettering on black back-ground. Inscriptions and lettering sizes shall be subjected to BPC.

3.10.3 Suitable plastic sticker labels shall be provided for easy identification of all equipment, located inside the panel/module. These labels shall be positioned so as to be clearly visible and shall give the device number, as mentioned in the module wiring drawings.

### 3.11 Space Heater

3.11.1 Space heater shall be provided in the Distribution pillar for preventing harmful moisture condensation. The space heaters shall be suitable for continuous operation at 240 V AC, 50 Hz. Single phase supply and shall be automatically controlled by thermostats. Necessary isolation switches and MCB's shall be provided.

### 3.12 Tests

3.12.1 AC Distribution panel/pillars, circuit breakers, instrument transformers, relays, meters etc., shall comply with the type test requirements and subjected to routine tests as per the relevant standards.

3.12.2 Type test reports for circuit breakers, bus bars, instrument transformer, relays and other important components shall be furnished by the successful bidder before the fabrication of Distribution panel/pillars is started.

3.12.3 Routine test shall be carried out on all Distribution panel/pillars and associated equipment's as per relevant IS by the manufacturer and witnessed by BPC.

3.12.4 Routine test shall be carried out in the presence of the Purchaser's representative if so desired by the purchaser.

3.12.5 All type reports according to IS: 8623 shall be submitted before dispatch of the equipment. Routine Test reports should be approved from the Purchaser's before dispatch of the equipment.

3.12.6 Equipment shall only be dispatched after the test certificate have been approved by BPC or its representative and written dispatch instructions issued to the equipment supplier/manufacturer.

### 3.13 Completeness of Equipment

The above details are representative technical details. The supplier/manufacturer of equipment shall ensure the completeness of equipment and any other item not specifically mentioned but required for the successful operation of the equipment or the safety of personal or to comply with the Indian Standard specifications shall be deemed to be included in the scope of supply without any financial liability to BPC, during the approval of drawings.

4.0 Miscellaneous Items

4.1 **Earthing Protection System**

4.1.1 Applicable Standards : ANSI/IEEE Std. 80 & 142  
IEC 61024, IS:2303,  
IS:3043, IS:2309

4.1.2 Requirements

4.1.2.1 Following material and sizes of earthing conductors, electrodes and shield wire shall be used for various purposes:

- a) Main earthing grid (buried in ground) - 50 x 6 mm MS
- b) Earthing leads for outdoor substation equipment - 50 x 6 mm MS (below ground) and 50 x 6 mm GS (above ground)
- c) Earth electrode - 40 mm dia, 3000 mm long, heavy gauge MS/GI pipe
- d) Distribution boards, control and relay panels, lighting panels, battery chargers, etc. - 25 x 3 mm GS
- e) Lightning shield wire - 7/3.35 mm stranded GS wire
- f) 16 SWG copper wire for lighting fixtures, metallic conduits, switch/receptacle boxes, etc.

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**Section 2C – Technical Specifications  
(Civil)**

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## 2C – TECHNICAL SPECIFICATION (CIVIL)

### 1.0 **General**

1.1 This specification covers the general requirements for design, manufacture, test, supply and construction of civil and structural steel works.

1.2 The contractor shall perform the works to meet the requirements of this specification, the attached bid drawings and the relevant articles of this Contract Document.

### 2.0 **Standards & Applicable Codes**

2.1 All materials, design, fabrication, galvanising and tests under these specifications shall conform to the latest applicable Indian Standards, codes or their equivalent established and approved in the country of manufacturer, and approved as equal by Engineer.

2.2 Any details not specifically covered by these standards and specifications shall be subjected to approval by Engineer. In the event of contradictory requirements between the standards and the specifications requirements, the terms of the specifications shall apply.

2.3 The Contractor may propose equivalent standards, specifications, materials etc. which shall be equal in every respect to that specified. If the Contractor for any reason proposes equivalents to, or deviations from, the above standards, he shall state the exact nature of the change, the reason for making the change and shall submit complete specifications of the materials, as well as copies of pertinent standards, for the approval of Engineer and decision of Engineer in the matter of acceptability will be the final.

### 3.0 **Scope of Works**

3.1 The scope of works for all civil works viz. both structures and foundations, include preparation of designs, supply of all materials, labour, plant and equipments, fixtures, fitting erection and all temporary and permanent works necessary for the satisfactory completion of the job in all respects for the major items of works listed below:

- Cable trench system, conduit, duct bank and handholes.
- Miscellaneous outdoor facilities.

### 4.0 **Earthwork**

#### 4.1 **Excavation**

4.1.1 Excavation shall conform to the dimensions and elevations as shown on the approved drawings. When foundations rest on an excavated surface other than rock, special care shall be taken not to disturb the bottom of excavation. When subsoil for foundation becomes murky on top due to construction operation or

any other reason, such subsoil shall be removed and replaced by one or more layers of compacted sand or crushed rock as directed by Engineer.

- 4.1.2 If any drainage system exists in the vicinity of excavation, Contractor shall control the grading in the vicinity of all excavations so that the surface of the ground will be properly sloped or dyked to prevent surface water from running into the excavated areas during construction.
- 4.1.3 When machines are used for excavation, the last 300 mm before reaching the required level shall be excavated by hand or by such equipment that shall leave the soil at the required final level in its natural condition.
- 4.1.4 When excavation requires shoring, bracing etc. Contractor shall submit to engineer drawing showing arrangement and details of proposed installations and shall proceed only after getting approval from Engineer.
- 4.1.5 Excavated material suitable for use as backfill shall be deposited by contractor in storage piles at the area approved by Engineer. However, surplus and/or unsuitable excavated materials shall be hauled and transported to the disposal area designated by Engineer.

## **4.2 Backfill**

- 4.2.1 Contractor shall place and compact the backfill materials to the lines, grade and dimension shown on approved drawings.
- 4.2.2 Prior to backfilling, all forms, temporary shoring, timber etc. shall be removed and excavation cleaned of all trash, debris, perishable/organic materials and shall be approved by engineer. The material to be used for backfill, the amount thereof and the manner of depositing the materials shall be approved by Engineer.

## **4.3 Crushed rock surfacing**

- 4.3.1 The work shall consist of surfacing course, composed of crushed rock, spread uniformly on the whole switchyard area in two layers in accordance with lines grades, cross sections as shown in approved drawings and as directed by Engineer.
- 4.3.2 The crushed rock shall be light grey limestone or others approved by Engineer. The ratio of length of thickness of the particles shall not exceed 2. The size of crushed rock shall be 50mm and downgraded.

## **4.4 Construction Method**

- 4.4.1 The preparation of area for spreading of crushed rock surfacing shall be done in such a way as to clear of all grasses, weeds, roots and all objectionable materials.
- 4.4.2 The first layer of lower size aggregate shall be spread uniformly and compacted to a thickness of 40mm.

4.4.3 The second layer shall consist of 50 mm and 25 mm size aggregate mixed in proportion of 2:1 by volume which shall be spread uniformly and compacted to a thickness of 60 mm so as to furnish a total thickness of 100 mm compacted surfacing.

## **5.0 Foundation Works**

### **5.1 General Requirements**

5.1.1 The design details of foundations for the substation structures to be constructed by the contractor shall be subjected to approval by Engineer.

5.1.2 The contractor shall submit installation drawings giving full erection particulars for approval of Engineer. The founding level shall be minimum one (1) meter below grade level within minimum 500 mm. inside the original ground.

5.1.3 All foundations shall be cast over 36 mm thick lean concrete as levelling course. All structural concrete shall be reinforced with minimum grade of concrete to be M20.

5.1.4 Foundation construction works includes excavation in all types of soil and backfill, shoring and pumping out water if required, conducting required tests, necessary embedment, curing and everything required for the satisfactory completion of works.

### **5.2 Design of Foundations**

5.2.1 All the foundations shall be designed for the worst combination of dead and live loads. Wherever applicable, wind loads, short circuit forces, seismic forces, effect of water table etc. shall be considered.

5.2.2 The foundations shall be designed such that the upper structures shall be securely supported, any unbalance displacement that may cause harmful effect to the upper structure shall not be produced. The safety factor for all types of stability of the foundations shall not be less than 2.0.

5.2.3 The foundations for electro-mechanical equipments shall be designed such that the upper equipment shall be securely supported. The effect of vibrations, impact loads when in operation and turn over forces due to abnormal conditions of equipment shall be considered for design. The safety factor for stability of foundation shall not be less than 2.0.

### **5.3 Detail Calculation**

5.3.1 Detail calculations for each type of foundation shall be submitted for approval of Engineer. Calculation shall show the following:

- Detail calculations of load acting on foundation under different loading conditions.
- Calculated safety factor for each type of stability and condition.

- Maximum stresses in concrete and steel reinforcement at any critical section.

## **5.4 Line and Grade**

5.4.1 Contractors shall provide all lines and grades or Engineer's approval shall be as shown on the approved design drawings and shall conform to the requirements described hereafter.

**No change shall be made without the written approval of Engineer. The drawings must include.**

- a) Detail dimensions of foundations
- b) Details of setting dimensions of foundations.
- c) Details of placing of all reinforcing steel which shall conform to the requirement of IS 456.
- d) Details of type, size and length of each reinforcing steel including details of bar bending.

## **6.0 Steel Structure**

### **6.1 General Requirements**

6.1.1 The scope covers detail design, preparation of design drawings, fabrication drawing, fabrication, galvanising and erection of structural steel works wherever necessary. All designs and drawings shall be subjected to approval of engineer. Engineer shall have the right to instruct contractor to make any changes in design and details necessary to make the construction conform to the Contract Documents.

### **6.2 Materials**

6.2.1 Steel shall conform to IS: 226/IS: 2062 (tested quality) for mild steel and IS: 961 for high tensile steel.

6.2.2 All connection bolts, U-bolts and nuts shall conform to IS; 6639. All washers (spring washers, bevelled washers, flat washers etc.) shall conform to IS: 2016/IS: 3063.

6.2.3 The minimum diameter of bolts shall be 16 mm. for members carrying calculated stress and minimum 12 mm. for other members.

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## Section 2D – Installation, Testing and Commissioning

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## **SCHEDULE 2D - INSTALLATION**

### **1.0 GENERAL**

- 1.1 The scope shall cover complete installation of plant items and accessories as indicated in various parts of the specification. Requirements/ guidelines/ information/ parameters/ instructions etc. specified in this part shall apply to all the parts.
- 1.2 Installation work pertaining to plant items and systems such as cabling, lighting, earthing and lightning protection systems, etc. shall comply with the applicable standards, safety codes etc.
- 1.3 Installation shall be carried out strictly in accordance with the approved drawings. Changes, modifications, if any, required to suit site conditions, shall be carried out only with the prior approval of the Engineer. All such changes shall be incorporated in the "As built" drawings to be furnished by the Contractor.
- 1.4 All tools, welding equipment, crane, scaffolding, rigging materials, ladders, consumables, hardware etc. required for installation shall be provided by the Contractor.
- 1.5 It shall be the responsibility of the Contractor to engage specialist engineers from his Sub-contractors/Manufacturers to supervise installation work for UG cables. Such services shall be arranged by the Contractor at no extra cost to the Employer.
- 1.6 It shall be the responsibility of the Contractor to obtain approval/clearance, if any, from local statutory authorities, for conducting any work for completed installation.
- 1.7 The Contractor shall ensure that work area and the project site are kept clean to the satisfaction of the Engineer. In case the Engineer is not satisfied about the site cleanliness, he will have the right to carry out the cleaning operations and expenditure incurred in this regard will be to Contractor's account, which will be deducted from the bills. Packing cases and packing material, except for spares shall be cleared from sites.
- 1.8 The Contractor shall take utmost care in handling instruments and other delicate mechanisms.

### **2.0 CABLING SYSTEM**

- 2.1 All apparatus, connections and cable work shall be designed and arranged to minimise risk of fire and any damage, which might be caused in the event of a fire.
- 2.2 Cables shall be laid directly buried in earth, on cable trays in built-up trenches, in conduits/pipes along walls/structures/foundations/ceilings, etc. The Contractor's scope of work includes unloading, excavation, laying, backfilling,

fixing, bending and terminating the cables. The Contractor shall supply the necessary material and accessories required for installation and termination of the cables which shall include but not be limited to items such as glands, lugs, terminating accessories, hardware, consumables, saddles/spacers, GI conduits/pipes, cable identification tags, protective bricks, civil materials, etc.

## 2.3 **Buried Cables**

2.3.1 Cable installation in outdoor areas such as switchgear to A2 structure shall be carried out in cable trenches/directly buried. Stabilized thermal backfilling shall be used for directly buried cables. Cabling from trenches upto junction box/equipment, etc. shall be carried out in GI conduit/pipes. Provision of GI pipe sleeves in trench wall shall be the Contractor's responsibility. Where cables cross roads or water/sewage pipes, the Contractor shall provide rows of 150 mm diameter GI pipes for passage of cables. Contractor shall also lay spare pipes for future use. LV cables shall be buried at a depth of minimum 750 mm while MV 11 kV cables shall be buried at a depth of minimum 900 mm. For road crossings, the pipe for the cables shall be buried at not less than one metre depth.

2.3.2 Directly buried cables shall be laid on a 75 mm thick sand bed. The cables shall then be covered on top and at their side with sand to a depth of about 150 mm. This shall then be gently pulled down to a depth of about 100 mm above the top of uppermost cable to provide bedding for the protective concrete cable covers, which shall be placed centrally over the cables. The protective cable covers shall be of reinforced concrete. The RCC covers shall have one hole at each end to tie them to each other with GI wires to prevent displacement. The trench should be then backfilled with the excavated soil after removal of stones and boulders and well rammed in successive layers of not more than 300 mm thick, with the trenches being watered to improve consolidation, wherever necessary. To allow for subsidence, a crown of earth not less than 50 mm in the center and tapering towards the sides of the trench should be provided.

2.3.3 All cables to be routed along any particular route shall be laid at one time to avoid repeated excavation, etc. Cable route markers shall be provided for directly buried cables at an interval of 30 m and at every bend on the route in the buried cable trench.

2.3.4 When groups of MV, LV and control cables are to be laid along the same route, suitable metallic barriers to segregate them physically shall be employed. When power cables are laid in the proximity of communication cables, minimum horizontal and vertical separation of 300 mm shall be maintained. Power and communication cables shall, as far as possible, cross at right angles to each other.

## 2.4 **Cables In Trays**

2.4.1 Cables in trays shall be cleated individually or in a group using GI saddles. Interval for cleating shall not exceed 1500 mm.

2.4.2 In case of laying on cable trays/racks, power and control cables shall be laid in separate cable trays, the order of laying of various cables being as given below:

- a) MV cables on top tiers
- b) LV cables on subsequent tiers
- c) Control, instrumentation and other service cables in bottom-most cable tier.

2.4.3 Ladder type GI cable trays and painted rack support shall be installed in cable trenches for power cables. Perforated trays shall be used for control and instrumentation cables. Embedded flats for fixing cable tray supports shall be provided in cable trenches to support the cable trays during civil works. Where such flats cannot be used, the fixing of cable trays shall be done using anchor fasteners.

## 2.5 **Cable Pulling**

2.5.1 Standard cable grips and reels shall be utilised for cable pulling. If unduly difficult pulling occurs, the Contractor shall check the pull required and suspend pulling until further procedure has been approved by the Engineer's Representative. The maximum pull tension shall not exceed the recommended value for the cable measured by the tension dynamometer. In general, any lubricant that does not injure the overall covering and does not set up undesirable conditions of electrostatic stress or electrostatic charge may be used to assist in the pulling of insulated cables in conduit / pipes and ducts.

2.5.2 After pulling the cable, the Contractor shall record cable identification with date pulled neatly with waterproof ink in linen tags/aluminum tag and shall securely attach such identification tags. Identification tags shall be attached to each end of each cable with non-corrosive wire. The wire must be non-ferrous material on single conductor power cable. Tags may further be required at intervals on long runs of cables on cable trays and in pull boxes. Cable and joint markers and RCC warning covers shall be provided wherever required.

2.5.3 Each cable shall be pulled into the particular conduit/pipe. In hand holes, pull boxes or junction boxes having any dimension over 1000 mm, all conductors shall be cabled and / or racked in an approved manner. Care shall be taken to avoid sharp bending or kinking cables, damaging insulation or stressing cable beyond manufacturer's recommendations in pulling. Cable shall be protected at all times from mechanical injury and from absorption of moisture at unprotected ends.

## 2.6 **Bending Radii for Cables**

2.6.1 The bending radii for various types of cables shall not be less than those specified below, unless specifically approved by the Engineer.

Description	Single Core	Multicore Armored	Multicores Unarmored
PVC insulated cable upto 11 KV	20D	12D	15D

Where D = Overall diameter of cable.

(For XLPE insulated cables, recommendations of manufactures to be followed).

- 2.6.2 The above values may be reduced to 70% when making only one bend such as in case of installing an end termination.
- 2.7 Cables on cable racks and in conduits/pipes shall be formed to avoid bearing against edges of trays, racks, conduit / pipes or their supports upon entering or leaving racks or conduit/pipes.
- 2.8 Cables splices shall not be used except where permitted by the Engineer's Representative. Splices shall be made by Contractor for each type of wire or cable in accordance with the instructions issued by cable manufacturers and the Engineer's Representative. Before splicing, insulated cables shall have conductor insulation stepped and bound or penciled for recommended distance back from splices to provide a long leakage path. After splicing, insulation equal to that on the spliced conductors shall be applied at each splice.
- 2.9 At cable terminal points, where the conductor and cable insulation will be terminated, terminations shall be made in a neat, skillful and approved manner by specially trained staff. Terminations shall be made by the Contractor for each type of wire or cable in accordance with instructions issued by cable manufacturers and / or the Engineer's Representative.
- 2.10 Control cable termination shall be made in accordance with wiring diagrams, using proper colour codes for the various control circuit.
- 2.11 When control cables are to be fanned out and corded together with a cord, the Contractor shall make connections to terminal blocks, and test the equipment for proper operation before cables are corded together. If there is any doubt about correctness of connection, the Contractor shall make a temporary connection with sufficient length of cable so that the cable can be switched to another terminal without splicing. After correct connections are established, cables shall be cut to their correct lengths, connected to terminals in the specified manner, and corded together where necessary to hold them in place in a skillful manner. Jointing of cables shall be in accordance with relevant Standards and manufacturer's instructions. Materials and tools required for cable jointing work shall be supplied by the Contractor. Cables shall be firmly clamped on either side of a 'straight through joint' at a distance of not more than 300 mm away from the joints. Identification tags shall be provided at each joint at all cable terminations.

- 2.12 When cables pass through floor or wall openings or other partitions, suitable bushes/pipe sleeves of GI shall be provided by the Contractor. The Contractor shall seal the cables at the bushes/pipe sleeves using fire resistant material.
- 2.13 Cable seals shall be examined to ascertain if they are intact and that cable ends are not damaged. If the seals are found to be broken, the cable ends shall not be jointed until after due examination and testing under supervision of the Engineer's Representative. Before jointing is commenced, insulation resistance of both sections of cables to be jointed shall be checked by megger.
- 2.14 In each cable run, some extra length shall be kept at a suitable point to enable one or two straight-through joints to be made, should the cable develop fault at a later date.

### **3.0 EARTHING PROTECTION SYSTEMS**

- 3.1 The Contractor shall install bare earth conductors as required for the system and individual equipment earthing. All the work such as cutting, bending, supporting, drilling, brazing / soldering, clamping, bolting and connections to structures, equipment frames, terminals or other devices shall be in the Contractor's scope. All hardware and consumables such as fixing cleats / clamps, anchor fasteners, lugs, bolts, nuts, washers, brazing electrodes, flux, bituminous compound, anti-corrosive paint, etc. as required for the complete work shall be included by the Contractor.
- 3.2 Tap connections (earthing leads) of more than 500 mm long from main earthing grid to equipment shall be embedded in the floor by the Contractor together with associated civil work such as chipping / chasing, concreting and surfacing, etc. The concrete cover over the conductor shall not be less than 50 mm.
- 3.3 The scope of installation of earth conductors in outdoor areas, buried in ground shall include excavation in earth upto 600 mm depth and 400 mm width, laying of conductor at 600 mm depth, brazing as required of main grid conductor joints as well as risers upto 500 mm above ground at required locations and backfilling. Backfilling material to be placed over buried conductor shall be free from stones and other mixtures. Backfill shall be placed in layers of 150 mm, uniformly spread along the trench and compacted. If the excavated soil is found unsuitable for backfilling, the Contractor shall arrange for suitable material from outside.
- 3.4 Wherever earthing conductor crosses underground service duct and pipes, it shall be laid 300 mm below them. If the distance is less than 300 mm, the earthing conductor shall be bonded to such service ducts / pipes.
- 3.5 The scope of installation of electrodes shall include installation of electrodes in constructed earth pits, and connecting to main buried earth grids. The scope of work shall include excavation, construction of the earth pits including all materials required for treatment (salt, charcoal, chemicals, etc.), placing the electrode and connecting to main earth grid conductors.

- 3.6 The work of embedment of earthing conductor in RCC floors / walls along with provision of earth plate inserts / pads / earth risers shall be done by the Contractor preferably before the floors / columns / walls are cast. The embedded conductors shall be connected to reinforcing rods wherever necessary.
- 3.7 The scope of installation of earthing leads to the equipment and risers on steel structures / walls shall include laying the conductors, brazing / cleating at specified intervals, brazing to the main earth grids, risers, bolting at equipment terminals and coating brazed joints by bituminous paint.
- 3.8 Earthing and lightning protection system conductors along their run on walls / columns, etc. shall be cleated at an interval of 750 mm.
- 3.9 Main earthing conductor shall be buried below the trench at crossing points.
- 3.10 Metallic frames of all electrical equipment shall be earthed by two separate and distinct leads and then connected with earthing system.
- 3.11 Neutral of a transformer shall be earthed to two separate earth electrode pit by two separate earth leads.
- 3.12 Crane rails shall be connected to the earthing system.
- 3.13 An earthing mat shall be provided under the operating handle of the disconnecter. Operating handle of the disconnecter and the supporting structure shall be bonded together by a flexible connection and connected to earth grid.
- 3.14 Metal pipes and cable conduits shall be effectively bonded and earthed by earthing clamps efficiently fastened to the conduit at both ends.
- 3.15 Neutral connection shall never be used for equipment earthing.
- 3.16 A separate earth electrode shall be provided for each lightning arrester and for each lightning conductor down comer.
- 3.17 Cable sheaths and screen shall be bonded to the earthing system.
- 3.18 Armour of multicore cables shall be bonded to earthing system at both ends, while that of single core cables shall be earthed at source end only. The size of conductor for bonding shall be appropriate with the system fault current.
- 3.19 Conduits, fixtures, junction boxes, etc. shall be bonded to the earthing system by 16 SWG diameter copper wire looped from lighting panel earth bus onwards. Outdoor lighting poles, junction boxes, etc. shall be earthed by 12 SWG copper wire.

- 3.20 Street light pole and junction box shall be earthed with 12 SWG copper wire tapped off from the 25 x 3 mm copper earthing conductor to be laid along the street lighting cable.
- 3.21 All metallic parts such as transformer, fence, gate, etc. shall be properly earthed.
- 3.22 Wherever earthing conductor passes through walls, galvanised steel pipe sleeves shall be provided for the passage of earthing conductor. The pipe ends shall be sealed by the Contractor, by suitable water-proof compound. Water stops shall be provided wherever earthing conductor enters the building from outside below ground level.
- 3.23 All connections in the main earth conductors buried in earth / concrete shall be brazed type. Connections between main earthing conductor and earth leads shall also be of brazed type. Connection between earth leads and equipment shall be by two bolts.
- 3.24 Installation of lightning conductors on the roof of buildings shall include laying, anchoring, fastening and cleating of horizontal conductors, grouting of vertical rods wherever necessary, laying, fastening / cleating / brazing of the down comers on the walls / columns of the building and connection to the test links to be provided above ground level.
- 3.25 The lightning protection air termination rods and / or horizontal air termination conductors shall be fixed in a firm manner. The necessary accessories such as cleats, clamps, brazing materials, bolts, nuts, shall be supplied by Contractor.
- 3.26 Air termination systems shall be connected to earthing system by down conductors. There shall not be any sharp bends, turns and kinks in the down conductors.
- 3.27 All joints in the down conductors shall be of brazed type. All metallic structure within 1 metre of down conductors shall be bonded to lightning protection system.
- 3.28 Every down conductor shall be provided with a 'test link' mounted on wall / column at about 1000 mm above ground level housed in a 16 SWG GS enclosure. The test joint shall be directly connected to the earth electrode.
- 3.29 The lightning protection system shall not be in direct contact with underground metallic service ducts, cables, cable conduits and metal enclosures of electrical equipment. However, all metal projections, railings, vents, tanks, etc. above the roof shall be bonded together to form a part of roof grid.
- 3.30 Lightning protection system down conductors shall not be connected to other earthing conductors above ground level. In addition, no intermediate earthing connection shall be made to lightning arresters and transformer, whose earthing leads shall be directly connected to electrode pit.

- 3.31 The earth conductor below ground level shall be MS while that above ground shall be GS. The connection between MS and GS shall be made above ground.
- 3.32 **Earth electrodes and pit**
- 3.32.1 Treated earth pits shall comprise of treatment material such as salt and charcoal or any other conductivity enhancing compound. Treatment material placed around the electrode shall be finely graded, free from stones and other harmful mixtures. Backfill shall be placed in 150 mm thick uniformly spread and compacted layers. If excavated soil is found unsuitable for backfilling, the Contractor shall arrange for a suitable soil from outside.
- 3.32.2 Earth electrodes shall be fabricated from minimum 40 mm diameter, 3m long, heavy gauge MS/GI pipe. The minimum spacing between adjacent electrodes shall be 6 m. Design and constructional details of electrode pit shall be subject to the Engineer's approval.
- 3.32.3 Electrodes shall, as far as practicable, be embedded below permanent moisture level.
- 3.32.4 Test pits with concrete covers shall be provided for periodic testing of earth resistance. Installation of electrodes in test pits shall be suitable for watering. The necessary materials required for installation of test pits shall be supplied and installed by Contractor. The installation work shall also include civil works such as excavation / drilling and connection to main earth grid.
- 3.32.5 Treated earth pits shall be treated with suitable treatment material mentioned above, if average electrical resistivity of soil is more than 20 ohm metre.
- 3.32.6 Typical earthing installation details are indicated in the drawing.

## TESTING AND COMMISSIONING

### 4.0 SCOPE

4.1 The Contractor shall carry out commissioning tests/completion checks in the presence of an engineer appointed by the Employer/Engineer. The commissioning engineer may verify any commissioning tests/completion checks to satisfy himself that the plant is fit and sound. The evaluation of test results and decision passed by the commissioning engineer regarding the test results will be final and binding on the Contractor. Any additional tests or repetition of tests to establish satisfactory operation of any equipment shall be carried out by the Contractor if so desired by the commissioning engineer at no extra cost. The test report needs to be signed by the engineer appointed by the employer, which shall be submitted during handing/taking over.

4.2 The commissioning tests/completion checks to be carried out shall include, but not be limited to, those described in subsequent paragraphs, as applicable to the individual equipment / system.

### 5.0 COMPLETION CHECKS/ COMMISSIONING TESTS

#### 5.1 Preliminary Checks

- a) Name plate details according to approved drawings / specifications
- b) Any physical damage or defect and cleanliness
- c) Tightness of all bolts, clamps and connections
- d) Condition of accessories and their completeness
- e) Clearances
- f) Earthing connections
- g) Correctness of installation with respect to approved drawings / specifications
- h) Lubrication of moving parts
- i) Alignment
- j) Correctness and condition of connections

#### 5.2 General tests

In general, the following tests shall be carried out on all the equipment / systems, as applicable.

- a) Insulation resistance measurement
- b) Dielectric tests
- c) Phase sequence and polarity
- d) Voltage and current ratios
- e) Vector group
- f) Resistance measurement of winding, contacts, etc.
- g) Continuity tests
- h) Calibration of indicators, meters, relays, etc.
- i) Control and interlock checks
- j) Settings of equipment and accessories
- k) Checking of accuracy / error

- l) Checking of operating characteristics, pick-up voltages and currents, etc.
- m) Operational and functional tests on equipment, accessories, control schemes, alarm / trip / indication circuits, etc.
- n) Measurement of guaranteed / approved design values including lighting levels, earth resistance measurement, etc.
- o) Complete system commissioning checks

5.3 Among other commissioning tests, the following shall be carried out at site after completion of installation. Contractor shall ensure use of calibrated test equipment having valid calibration test certificates from standard laboratories traceable to National Standards / International Standards. All tests shall be carried out in the presence of Engineer's representatives.

#### 5.3.1 Cables

All cables shall be tested for insulation resistance before and after terminating / jointing.

Cable core shall be tested for

- a) Check details as per specification
- b) Check for physical damage
- c) Absence of cross phasing
- d) Megger test between each core and armour/sheath
- e) Insulation resistance to earth
- f) Insulation resistance between conductors
- g) Connections
- h) High voltage test

#### 5.3.2 Lighting System

Commissioning tests stipulated in applicable standards and code of practice covering all lighting system equipment

#### 5.3.3 Earthing System

Continuity of all conductors and joints shall be checked. The Engineer's representatives may ask for earth continuity tests, earth resistance measurements and other tests, which in his opinion are necessary, to prove that the system is in accordance with design, specification, code of practice and electricity rules. Earth grid resistance value should be not greater than one ohm.

### 6.0 **TAKING OVER**

6.1 No item of the entire Works will be certified for 'Taking over' unless it has passed all the tests.

6.2 A 'Taking Over' Certificate for Works will be issued only after the requisite documentation of commissioning tests are duly compiled and approved by the Employer / Engineer.

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Section 2E – Drawings, Test  
Certificates, O&M manuals

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## 1.2 **Detailed Drawings**

1.2.1 The Contractor shall submit to the Engineer all equipment data and detailed drawings. These shall include general arrangement, details of equipment, foundations, cable routing, openings in walls and floors, wiring diagrams, cable schedules, interconnection diagrams, etc. necessary for the erection of plant. These drawings/data having been corrected or amended as necessary based on the Engineer's comments shall become the 'Approved' drawings/data to be used for manufacture and erection of plant.

1.2.2 Minimum details required on drawings of different categories are given below:

List of Drawings : A detailed list of drawings indicating therein drawing nos. and titles.

Programme : i. All activities from the start date upto commissioning shall be included. Separate programmes shall be furnished for each of the activities of site.

ii. Earliest and latest occurrence of each activity.

iii. Constraints, if any.

(The activities for each of the items shall essentially cover time-table for activities such as placement of order with sub-vendors, engineering, submission of drawings, review and approval by the Engineer, manufacture, inspection, delivery, erection, testing and commissioning. All events shall be represented in a proper sequence of occurrence with due consideration for inter-dependent activities and all periods shall be counted from the start date).

<b>Type of Drawing</b>	<b>Minimum Details Required</b>
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Single line diagrams	i. All equipment connections with ratings, polarities, protection and metering details etc.
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ii. Cable details for all circuits.
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iii. Details of meters and major components associated with each circuit.
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v. Reference drawings.
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General	i. Dimensional layout drawings Arrangement covering complete layout (Equipment, cabling, earthing, lightning protection, lighting, etc.)
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- ii. Plans and sections as required to show details access space/ clearances, etc.
- v. Reference drawings

In addition to the above, the Contractor shall also submit adequate copies of all relevant supporting literature/catalogues.

### 1.3 **Record Drawings**

- 1.3.1 Within eight (8) weeks of successful commissioning tests, the Contractor shall furnish the 'Record' drawings. Submission to and approval by the Engineer of the 'Record' drawings shall be pre-requisite for the 'Taking Over' Certificate. The drawings shall show the whole Plant as installed and shall include electrical/mechanical and civil components with schematic and wiring diagrams for all items of electrical equipment included in the Works. The record drawings shall be furnished in neatly bound volumes. Reduced copies of the relevant drawings shall be included in the operating and maintenance manual.

### 1.4 **Specific Requirements**

- 1.4.1 Following information/ drawings shall be submitted after the award of Contract for approval of the Engineer:

- a) Updated program along with the list of drawings.
- b) Lighting system  

Lighting layout drawings for indoor and outdoor areas showing layout of lighting fixtures, conduit/cables, lighting circuit distribution scheme, complete bill of material, locations of control switches, receptacles, etc. and mounting details for fixtures, switches and receptacles as well as manufacturer's catalogues/literature showing dimensions, weights, light distribution diagrams (zonal and isocandela), etc.
- c) Earthing and lightning protection systems  

Layout drawings for earthing and lightning protection systems showing earthing grid, locations of earth electrodes, routes of conductors, interconnections, earth leads to various equipment, bill of material etc.
- d) Miscellaneous systems  

Detailed general arrangement, schematic and other drawings, bill of material and manufacturer's catalogues/literature.
- e) A schematic-wiring diagram and general-arrangement drawing of the AR offered.
- f) Typical installation drawings

Cabling, lighting, earthing and lightning protection as well as miscellaneous system drawings showing all necessary details.

## 1.5 **Submission of Drawings**

1.5.1 The list of drawings and the programme shall be submitted within 45 days from the start date of the project.

1.5.2 All other drawings shall be submitted progressively thereafter within a period of 90 days. Sequence of drawings to be submitted within the above period shall be finalised with the Engineer in advance.

## 2.0 **TEST CERTIFICATES**

### 2.1 **Type Test Certificates**

2.1.1 Type test certificates for MV and LV Cables shall be furnished after the award of the contract and finalizing the vendor:

2.1.2 Type test certificates shall be furnished for tests carried out on similar type/design of equipment.

2.1.3 Type test certificates will be accepted, if date of the certificate is not earlier than 5 years as on date of Bid submission and in the event there is any deviation to the tested equipment from the offered equipment or the certificate is earlier than the stipulated period, the Employer reserves to get the type testing done without any extra cost.

### 2.2 **Routine Test Certificates**

2.2.1 Routine test certificates for all the plant items and accessories shall be furnished.

2.2.2 Routine test certificates shall be furnished in addition to test reports, which will be collected at the time of inspection.

2.2.3 Routine test certificates shall be furnished for review by the Engineer within seven (7) days after completion of inspection of relevant item or as instructed by the Engineer in case of items for which witnessing of tests is waived.

## 3.0 **OTHER DOCUMENTS**

3.1 Technical catalogues, descriptive literature, characteristic curves, write-up on schemes where required in support of relevant control/annunciation drawings etc. shall be furnished for all the items of plant and accessories/components.

3.2 Documents pertaining to cables shall in addition, include current ratings, derating factors, physical and electrical data, recommended bending radii etc.

3.3 Documents in respect of lighting system equipment shall include data in respect of each type of lighting fixture/switch, receptacles/miniature circuit breaker and wires to be used in circuit wiring. Data on lighting fixtures shall include

dimensional drawings, cable entry facility, mounting details and weight, light distribution diagrams, light absorption and utilisation factors, lamp data etc.

3.4 Contractor shall note that the documents mentioned above shall be made available along with relevant drawings (listed in Clause 1.4.2 above) of plant items/accessories/components etc. as supporting documents to facilitate expeditious review of such drawings.

#### 4.0 **OPERATING AND MAINTENANCE MANUALS**

4.1 The Contractor shall provide five (5) bound sets of approved manuals. All descriptive leaflets, instruction sheets, charts, lists, pamphlets and other documents that are used in compiling each manual shall be contained in one or more binders designed to prevent loss of contents. Each binding shall be titled with the name of the Employer, the name of the project, the Contract number, the name of the Contractor and with information to identify the subject matter and shall include a detailed index to all the literature contained therein.

4.2 The manuals shall be initially approved in draft form by the Engineer and shall cover all items of the Works. For this purpose, three (3) draft copies shall be submitted to the Engineer. Final submission of manuals shall be done after satisfactory completion of commissioning tests. A mere collection of manufacturers' descriptive leaflets will not be acceptable in satisfaction of this Clause. Information pertaining to items selected for this project shall be clearly indicated in such leaflets. The manuals shall comprise both operating instructions and maintenance instructions. The Operating manual should also highlight operation of the Plant in conjunction with the system. Thus, a general tie-up between system and equipment shall be available in the manuals.

4.3 A separate section of a manual shall be devoted to each size and type of equipment. It shall contain a detailed description of its construction and operation and shall include all relevant pamphlets and a list of parts with procedure for ordering spares. Operation of electrical equipment shall be described step by step giving the complete sequence of operation. The detailed sections of the manual, if necessary, shall contain further maintenance instructions and fault location charts.

4.4 The manuals shall be printed on A4 size sheets and shall be bound. Reduced copies of record drawings shall also be included in the manuals.

4.5 The operating instructions shall include the following:

4.5.1 Step by step directions on setting the plant to work, listing all adjustments and settings necessary for the correct functioning of the plant.

4.5.2 List of plant alarms giving possible causes for alarm initiation and sequence of remedial actions to be taken.

4.5.3 Instructions on monitoring of plant performance and sample log sheets for each plant item, to be filled by operators on a routine basis.

- 4.5.4 "Do's" and "Don'ts" in plant operations. Operators' attention shall be drawn to all operations considered to be dangerous to operators or likely to cause damage to the plant.
- 4.6 The maintenance instructions shall include the following:
  - 4.6.1 Checking, testing and replacement procedures to be carried out on all plant items on a daily, weekly and monthly basis or at longer intervals to ensure trouble-free operation.
  - 4.6.2 Fault locations and remedy charts to facilitate tracing the cause of malfunctions or breakdown and correcting faults.
  - 4.6.3 A 'spares schedule' which shall consist of a complete list of itemised spares for all plant items with ordering references and part numbers.
  - 4.6.4 A complete list of manufacturer's instructions for operation and maintenance of all bought-out equipment. The list shall be tabulated in alphabetical order giving the name of supplier/manufacturer, identification of the plant item giving the model number and the literature provided including instruction leaflets and drawing numbers.
  - 4.6.5 Full instructions to cover the complete dismantling and re-assembly of all items of plant.
  - 4.6.6 Part-list and drawings or exploded diagrams for such items of plant showing manufacturing tolerances, matching clearances between machined components at the time of supply, maximum wear and clearances permitted to facilitate replacement.
  - 4.6.7 Complete list of recommended lubricants and lubricating chart, insulating oil and insulation checking/ replacement chart.

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## Section 2F – Contractor Safety Program

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## **SECTION 2F - CONTRACTORS SAFETY PROGRAMME**

### **1.0 SAFETY ORGANISATION**

#### **1.1 Safety Policy**

The Contract Organisation shall have a written health and safety policy issued by the Chief Executive of the Organisation; appropriate to the scale and nature of the risks involved in the contract works. A copy of the Policy shall be made available to the Employer at the time of contract in evidence of Contractor's commitment to management of employee's health and safety and compliance to Statutory and regulatory requirements. The Policy along with its Component operation procedures shall be evidenced as working document publicised among Contractor's and his Sub-contractors' employees through appropriate language/s. All Contractors' employees shall be familiar with the Safety Policy and their role and obligations in its implementation. The Policy shall meet the relevant statutory and regulatory requirements and the requirements of the Employer. The Policy shall periodically be reviewed for updating with respect to new and emerging legal and other requirements.

The contractor shall also BPC safety instructions which will be given successful contractor.

#### **1.2 Safety Representative**

- a) Contractor shall appoint a Safety Representative (SR) meeting statutory competence requirements, with a minimum experience of five years of safety management in comparable contracts, approved by the Employer on the basis of his qualification and experience. The SR shall give his whole time to the superintendence of the Health and Safety Programme of the Contractor.
- b) The Contractor shall also nominate in writing competent Safety Appointees from different disciplines to assist SR in implementation of health and safety measures in their routine contract works. The SR shall have sufficient authority to direct Contractor's or his Subcontractor's personnel to meet health and safety requirements and to stop performance of work until such requirements are met.

#### **1.3 Employee consultations, Safety Committee and communication**

- a) Contractor shall ensure full involvement of all his employees recognising their right to consultation on health and safety matters. The safety appointees of the various areas, in conjunction with the SR shall be responsible for ensuring employees' involvement through routine safety inspections, hazard and risk assessment in new and changed works and their control. Contractor shall maintain appropriate operating procedures to guide these requirements.
- b) The Contractor shall also appoint a Safety Committee (SC) comprising of Safety Appointees from the various areas under the chairmanship of the SR .The committee shall meet at periodic intervals to discuss the status and adequacy of the safety management, and any safety concerns of the employees. The committee shall also formulate and validate the safety procedures

incorporating controls to prevent or mitigate hazards and risks before submission for approval by Employer / Engineer. The minutes of SC meeting shall be submitted to the Employer / Engineer. SR shall maintain the records of the meetings.

- c) Contractor shall communicate to the employees regularly on job hazards applicable to their tasks in hand. Safety Appointees (SA's or any of SR's nominees) shall hold 'Toolbox talks' for this purpose on a routine basis before undertaking any safety critical and / or non-routine activities. Weekly meetings of the Contractor and his Subcontractor attended by the SR and SA's shall include safety as a key item in the agenda to discuss hazards and risk assessments, Job safety analysis, control procedures and to review accidents and incidents (Near-miss) for remedial measures to prevent such occurrence. The minutes of the meeting shall be submitted to the Employer / Contractor. SR shall maintain the records.

#### 1.4 **Contractor's safety reports**

The Contractor shall submit a monthly written report to the Employer / Engineer, which shall be due on the fifth workday of every month. The health and safety of all full time, part-time, permanent, temporary contract employees and any outsourced employee undertaking any part of the contract-works shall be included in the safety report. The report shall include the total number of working hours for the month, the number of recordable accidents and the number of lost-time accidents. A cumulative trend plot of the monthly severity and frequency rate of the reportable accidents shall be included in the monthly safety report and calculated as:

$$\text{SEVERITY} = \frac{\text{LOST MANDAYS DUE TO LOSS-TIME INJURIES} \times 1000000}{\text{MANHOURS WORKED}}$$

$$\text{FREQUENCY} = \frac{\text{NUMBER OF LOST TIME INJURY} \times 1000000}{\text{MANHOURS WORKED}}$$

Contractor shall arrange to display the safety statistics and the cumulative plot of severity and frequency of accidents mentioned above painted in a board prominently displayed, as a means of encouragement and assurance to all interested parties and for publicising the safety achievements.

#### 1.5 **Contractor's accident/incident reports**

"Accident" for the purpose of this clause is defined as "Undesired event giving rise to death, ill-health, injury, damage or other loss" and "Incident" is defined as "Event that gave rise to an accident or had the potential to lead to an accident". An accident where no ill health, injury, damage or other loss occurs also referred to as "near-miss". Incident includes near miss.

The Contractor shall report orally, to Employer and Engineer regardless of their extent, duration and severity, immediately on occurrence of all accidents resulting in:

- a) personal injury,
- b) property damages,
- c) Fires,

- d) spills and
- e) Near misses.

Contractor shall submit the accident / incident report in writing to Employer / Engineer within 24 hours of its happening in the form as prescribed by the governing statute or in the absence of which, in the form prescribed by the Engineer. Contractor shall detail in the Accident / Incident report, the particulars of the dangerous occurrence leading to the accident, lost time of absence due to accident, root cause analysis and the corrective and preventive actions to prevent such recurrence. In addition, Contractor shall include his estimate of the impact of accident on project schedule. Incidents shall also be reported in the same manner identifying root cause/s to eliminate such potential occurrence or risks.

#### 1.6 **First - aid personnel and facilities**

- a) The contractor shall make available first-aides, first-aid boxes and / or first aid stations as per statutory requirements. The persons holding current certificates of competency of recognised institutions in prescribed numbers as per any governing statute and in the absence of such regulatory requirement a minimum of two first-aides for each area of work for every hundred workmen shall be available. First-aides' names shall be prominently displayed.
- b) The first -aid boxes shall display contents of medical and medicinal articles with quantity maintained, which shall be in accordance with governing statute. Nominated first-aider shall replenish stock promptly.
- c) The first-aid refresher training shall be provided at least once in a year and all employees shall be encouraged to undergo first-aid training. A record shall be kept of all first aid treatments with particulars of treatment and personnel providing the treatment.

#### 1.7 **Ambulance room and ambulance vans**

Employer shall arrange for an ambulance room and an ambulance van directly or outsource the facilities meeting the governing statutory needs for prompt transportation of serious cases of accident and or sickness to the Hospital. Such facilities shall be maintained in good repair and equipped with facilities such as dry powder type extinguishers, flashlights Portable Oxygen Unit, self-contained breathing apparatus, etc as prescribed by the governing statute.

#### 1.8 **Induction and job-safety training**

- a) Contractor shall maintain a procedure for identification of the training needs and training his employees to create a health and safety conscious work force that will comply with the law and safety requirements of the Organisation. He shall also maintain a procedure for safety induction and initial training as well as follow-up training on the job safety for new entrants. All employees shall receive effective training and periodic refresher training on the operation control procedures specific to their tasks designed to control the job-safety risks. A booklet of such operation control procedures and safety rules with need based pictorial illustrations shall be made available to all employees who are to learn and be familiar with such procedures. All training shall be

monitored for effectiveness as per established procedures. Contractor shall maintain records of all training.

- b) Safety Representative and Safety Appointees shall conduct regular fortnightly or weekly mock-safety drills for different imaginary accident scenarios, in premeditated work so as to provide on-job training such as:
- i use of safety appliances such as water monitors, hydrants, hydrant pumps, fire-hoses, extinguishers, breathing apparatus and safety harness for working at height,
  - ii response to health & safety emergencies,
  - iii fighting fires using different equipment and
  - iv first aid

Participants shall receive training during mock-drills through role-play of their normal expected tasks during emergencies and fire fighting. The degree of demonstrated ability in the chosen tasks during such safety drills shall be recorded as participants' competence level for planning his further training. The experience gained in mockdrills shall be used to update of operational control procedures and the training needs. The roster of participants and contents for routine mock-drills shall be appropriately planned to cover all employees in the training at least once in four months.

- c) The Safety Representative and Safety Appointees shall be trained on a standardised comprehensive advanced training programme covering safety management, legal aspects, techniques of hazard identification and risk assessment and specific job-safety in various disciplines of the plant and equipment of the Contractor. The training records shall be maintained subject to audit by Employer / Engineer. Training effectiveness shall be assessed and recorded and used as input for further training plans of the employee.

## 1.9 **Health and Safety Promotion**

Safety posters, banners and slogans displayed for safety promotion shall be rotated at frequent intervals. The Contractor is encouraged to have safety promotion as an item in the safety committee agenda. Contractor is encouraged to include safety promotion programmes such as safety bulletins, magazines, competitions in slogan and poetry writing on safety, screening of safety films, celebration of national safety and environmental day, safety suggestion schemes and safety library, etc.

## 1.10 **Purchase and Procurement Control**

- a) The Contractor shall maintain a procedure for control of his purchases to ensure that all safety requirements are appropriately vetted by the safety personnel during all stages of procurement including planning of specifications, inspection for acceptance and commissioning in order that threats to safety are not overlooked and appropriate attention is paid to the training of personnel in the operation of Contractor's new or changed machinery and their operation control procedures, to prevent / control risks.
- b) Contractor shall exercise due diligence in appointing his Sub-contractors and outsourcing contract services that no new health and safety threats are created. Contractor shall ensure personnel of Sub-contractors and outsourced contract services are competent in health and safety management to meet the Policy

requirements. They shall be made aware of the safety rules, emergency procedures and any information that will have a bearing on the safety, health and related contractual obligations

#### 1.11 **Hazard Identification and Risk Assessment**

- a) Contractor shall ensure that his key personnel and safety personnel are trained to be competent in hazard identification, risk assessment and risk control processes. Contractor shall on a routine basis identify, evaluate and control all health and safety risks especially in the hazardous work activities and also to validate the previous risk assessments. Elements such as hazard identification, evaluation of risks with existing control measures in place and estimate of tolerability of the residual risks shall be an ongoing process. Any additional / new control measures shall be designed based on this process on need basis.
- b) Contractor shall maintain a Hazard Identification, Risk Analysis and Risk Control Manual (HIRARC) pertaining to all his activities duly updated as detailed above. The HIRARC manual shall be made available to the Engineer during regular inspections and audits.

#### 1.12 **Work Permits**

The Contractor shall maintain a work permit procedure to limit the hazardous processes and high risks tasks to authorised personnel, who shall be informed of the job safety analysis and the job specific safety precautions, on issue of a work-permit. The work permit issued under the procedure shall be valid for a specified period and shall be issued only after all safety precautions are fulfilled and duly verified by SR / SA or specialists who are authorised for safety certification as a prerequisite for issue of a work permit. The work permit shall be appropriate for the purpose for which it is issued. The different work-permits are:

##### a) **Safety Work Permit (SWP)**

SWP is mandatory for working in heights, on fragile roofs such as Asbestos or such roofing works, Steel Erection, Work over water, a live substation or switchyard even if section of work is not electrically charged, Demolition, Blasting and such potentially hazardous Contract works in the opinion of the Employer / Engineer.

##### b) **Electrical Safety permits/Lock-out and tag out (ESP: LOTO)**

Contractor shall institute an electrical safety permit system to ensure safe electrical isolation. Safety permits shall not be issued until safe release tag is placed on the equipment isolated on all isolating points. The safety permit shall be returned on satisfactory completion of the job by the executing agencies duly signing off indicating that all shorts and grounds and men and materials are removed from the job and that the job is safe for energising. This is a prerequisite to energise the isolated equipment. The safety tags shall be collected in the order i.e. first the isolated equipment and lastly the tag on the main control of the equipment. The tags and permit system shall be auditable.

#### 1.13 **Job Safety Inspection**

The contractor shall maintain a procedure for Safety Inspection at routine intervals to provide assurance that the instituted safety procedures are in place to prevent deviations from established standards that could lead to a safety hazard and consequential risk. The Contractor shall establish appropriate standardised checklists for systematic job safety verification to ensure:

- a) set standards are followed without deviation,
- b) employees are competent to perform as per prescribed operation control procedures,
- c) monitoring of safety of the various work areas/tasks and
- d) adequacy of existing operation control procedures and practices to mitigate and eliminate risks.

Should the existing operation control procedures prove inadequate and the residual risks are higher than tolerable levels, SR shall initiate hazard and risk assessment / analysis and consultations with Safety Committee to deploy appropriate remedial measures and improved operation control procedures. Periodic inspection reports and proposed remedial measures shall be submitted to the Employer. Records of changes in processes; consultations with Safety Committee and revision of Operational controls shall all constitute objective evidence of the existence of established procedures.

#### 1.14 **Safety Audits**

- a) Contractor shall undertake periodic safety audits to confirm through investigative methods the effectiveness of the measures set out in the Safety Policy. In order to be effective such safety audit shall be comprehensively covering all aspects detailed in this specification to ensure effective Loss-control / accident prevention programme. Safety audits shall take into account the safety inspection records, remedial measures and effectiveness of the safety programme. Effectiveness of safety Programme shall be based on Contractor's effective Hazard identification and risk assessment processes for design of Operation control procedures and on the safety statistics. Audit reports and preventive actions and Safety Improvement programmes shall be submitted to Employer.
- b) Employer shall retain his right to audit Contractor's Safety management System either directly by his Employees or his nominated representatives for its effectiveness.

## 2.0 **EQUIPMENT AND SUBSTANCES AND PERSONAL SAFEGUARDING**

### 2.1 **Mechanical Safety**

- a) Contractor shall ensure that all his equipment and machinery are safe to use while in motion or working. Operators shall have received training or instruction on operation of the machinery and the regulatory requirements. Contractor shall have adequate procedure to ensure the stability and securing of his working machinery during operation. He shall restrict repair and maintenance of the machinery to trained personnel and maintain records of repairs and maintenance. The equipment shall have appropriately designed means of isolating from sources of energy and shall have emergency stop control, which is easily accessible. All controls shall be clearly and uniformly

marked. All operation controls, interlocks, sensing devices and guards on tools and equipment shall be functional and their status shall be regularly checked and recorded. Contractor shall provide evidence of compliance to these requirements in any contractual write-ups submitted to Employer / Engineer for approval in respect of critical construction / contract works.

- b) Contractor shall provide only good quality handtools and ensure control of condition, storage, routine inspection and use of such hand-tools. Unsafe tools such as with cracked or broken handles, mushroomed chisels and punches, worn screwdrivers, hardened hammerheads; power tools with unsafe resistance to earth or without safety guards shall be prohibited.
- c) All safety ladders, scaffolding and access equipment shall meet requirements of IS 3696 and IS 4014:1967 and any such standards that the Employer / Engineer may stipulate. The safety work permits shall be issued only after ensuring that all safety requirements of access equipment are complied with. Access equipment shall be inspected on a routine basis to prevent injuries caused by falls.
- d) Contractor shall ensure safety of all those concerned with lifting and those who may be affected by material hoisting, lifting and handling using various mechanical aids. All lifting equipment such as cranes, hoists, lifting shackles, hooks chains and links shall be designed as per appropriate International codes of construction. Operators shall have been trained in operation and maintenance of such equipment besides training on standard hand signals to be employed during the hoisting and lifting operations. Safe working loads (SWL) shall be marked on equipment prominently. SWL shall be evidenced to have been established by test procedures in accordance with acceptable codes of practices.
- e) Riding on construction equipment, forklifts and cranes shall be prohibited unless such vehicles are provided with passenger seats.
- f) Signs, barricades, barrier tapes and warning or entry restriction devices or accessories shall be provided to minimise work related risks of accidents and injuries. Signage shall meet all regulatory requirements such as The Building and other Construction Workers Act 1996, Factory Act 1948, Manufacture, Storage, Import of Hazardous Chemicals Rules under Environmental Protection Act 1986, Indian Explosives Act 1984 and Gas Cylinder Rules 1981 and Indian Electricity Act 1910 and Rules there of and any other safety requirements of Employer / Engineer, as applicable.

## 2.2 **Electrical equipment - Safety**

- a) Contractor shall provide only such equipment for work that is electrically safe to work. Contractor shall have a procedure to identify and record all his electrical equipment in a register, with provisions to record his periodic inspections of such equipment. Inspection shall cover cables, extension leads, all electrical equipment drawing power from socket outlet. He shall identify and maintain in good working order all electrical installations. The installed equipment shall be periodically inspected by qualified personnel to ensure their continued safe operating condition. Inspection shall include earth polarity checks, continuity checks and earth resistance checks. Contractor shall ensure

use of flameproof and explosion proof switchgear and lighting fittings where required as per governing codes.

- b) Approved earth leakage relays or alternative safety devices to relevant IS/International codes shall be used on all portable electrical hand tools. Where possible low-voltage electric power supply shall be used for handtools. Earth leakage units shall protect electrical installations in storeroom, pantry, transit rest room, Office / Record room, switchgear rooms, control room and battery room. Record of regular checks shall be maintained. Contractor shall comply with "Code of practice for earthing" as per IS 3043:1987.
- c) Contractor shall arrange displaying signages under Indian Electricity Act 1910, such as :
  - i Danger notices as per IS 2551 in conspicuous places on all low, medium and high voltage installations as per Rule 35,
  - ii Notice prohibiting unauthorised entry in areas where electrical apparatus are used.
- d) All power cables providing construction power to various constructions machinery and the connectors shall be in safe and sound condition. Cables shall be routed through cable trays supported on appropriately designed structures, duly clamped, secured and identified. Road crossing cables shall be laid in conduits buried at least 600 mm below the surface to prevent damage due to vehicular traffic. All cables shall be off the floor to avoid damage or tripping hazard. Cables shall be terminated at the switchgear and sockets in a workman-like manner to prevent loose contacts and flashover. Only safety receptacles shall be used for providing power connection to hand-tools. All switches and distribution boards shall be clearly marked. All electrical distribution and panel wiring diagrams shall be available with the electrical maintenance personnel. Contractor shall maintain a safe electrical isolation / lockout procedure.
- e) Contractor shall ensure lighting circuits are not used for hand-tools. No electrical equipment shall be overloaded. Tools and test equipment used on electrical systems shall be insulated.

### 2.3 **Substances abuse plan**

The contractor is encouraged to have a "substance abuse programme", and pre-employment drug testing. Drinking during working hours shall be strictly prohibited. Contractor shall promote through poster and other publicity, awareness on abuse of substances such as alcohol and such depressant drugs that slows the activity of brain and spinal cord on abusive usage endangering the safety and health of users and others affected by their work.

## 2.4 **Hazardous substances control**

- a) Contractor shall prevent all injuries, illnesses and damage to property or the environment caused by any article or substance, which proves to be hazardous. The code of practices of construction, operation, maintenance and control procedures shall meet required statutory and regulatory requirements. Personnel shall be trained on use, handling, storage and disposal of emergency spillage procedures.
- b) Contractor shall detail and deploy Operational controls to reduce hazardous wastes and their disposal as required by the statute “ Hazardous Waste (Management and handling) Rules 2000”. Oil wastes, used oils, soil and cotton soaked in oil consequent to handling operations, grease, many class of paints, asbestos sheets and gaskets are typical hazardous wastes.

## 3.0 **PERSONAL SAFEGUARDING**

### 3.1 **Personal protection equipment (PPE): general**

Contractor shall provide his employees required PPE meeting the requirements of the stated IS Specifications and Guidelines or equivalent International Standards as may be prescribed by the Engineer from time to time. Contractor shall have instituted good working procedures and practices in providing PPE, maintenance, issue and training on their use. All PPE shall be periodically checked to ensure worn so that damaged equipment are replaced expeditiously.

#### a) **Control of use of issue, use and maintenance of PPE:**

Employees shall be responsible for PPE issued to them. Contractor shall meet requirements of IS 8519: 1977 titled “Guide for selection of Industrial safety equipment for body protection” or any equivalent International Specification that the Employer / Engineer may prescribe.

#### b) **Head Protection:**

Contractor shall comply with requirements as per IS 2925. It is mandatory for the contractor to provide safety helmets to all the persons working at the site.

#### c) **Eye and face protection:**

Eye protection shall be worn during all operations by operators and people in the vicinity, where there is a danger of flying particles of metal such as generated during use of hand tools such as chisels, grinding, welding and cutting lathe work on brass and cast iron acid and alkali splash, and high pressure jet cleaning or insulation removal from heights using high pressure jets. Contractor shall meet the requirements of IS 8540:1978 titled ”Guide for selection of Industrial safety equipment for eye and face protection”.

#### d) **Footwear:**

Safety shoes boots and gumboots fitted with steel toecaps of approved quality conforming to prescribed Indian or International standards shall be used. Wearing of unsafe safety shoes such as jogging shoes, tennis shoes, slippers and sandal etc. shall be prohibited. Contractor shall meet the requirements of IS

10667:1983 titled "Guide for selection of Industrial safety equipment for protection of foot and leg".

e) Protective clothing:

Contractor shall prevent hazards of loose clothes worn by workmen getting caught in moving machine parts. Loose and thin garments such as Dhoti and pyjamas shall be prohibited. While Contractors shall ensure that all workmen wear long sleeved shirts, jackets or the like with the sleeves rolled down and secured at the cuff, long pants / trousers extending upto the top of the safety shoes so as to prevent injuries caused by contact with heat, cold abrasive and sharp surfaces shall be strictly enforced. Contractor shall meet the requirements of IS 8990:1978 titled "maintenance and care of industrial safety clothing."

f) Hand Protection:

Contractor shall provide appropriate hand gloves as per IS 8807:1978 titled: "Safety equipment for protection of arms and hands" to prevent injuries to hands during work. Contractor shall maintain appropriate inventory of gloves for different applications like acid / alkali handling, general-purpose work gloves and asbestos or heat resistant hand gloves, etc.

g) Safety harness : Fall arrest :

Contractor shall provide safety harness or means of restraint such as safety belts, harness and lifelines, etc to workmen engaged to work in heights such as Open – sided Floors, Open-sided scaffoldings, floor and roof openings, overhead construction works of various nature, etc where there is a falling hazard of six feet or above. Storage, issue wearing and maintenance of safety harness shall be under strict supervision and records shall be maintained. All fall arrests shall consist of full-body harnesses, lanyards with shock absorbers, lifelines, rope grabs and associated hardware. Two alternate lanyards shall be used to facilitate tying off at a new location before disconnecting from the previous location's of practices for safety harnesses and fall arrests shall conform to IS 4912:1978, IS 11972:1987, IS 8519:1977 or equivalent International codes.

h) Falling object protection:

Where work is in progress in elevated areas; barricades, barrier tapes signs and such entry restriction devices shall be used to keep area below clear of personnel to prevent injury due to falling objects. If work is required in the area below elevated work area, it shall be scheduled at a time different from elevated works. The workmen below shall be protected from falling objects by the debris net or a catch platform with an adequate toe board to prevent material from falling off. Use of safety net for elevated works shall be considered in the work-permits where appropriate. Where a lift is made above a working area, the area below the path of the lift shall be cleared of personnel during the lift and barricaded and guarded to prevent entry of persons generally in conformity with IS 4912, IS 11972 and IS 13416 for "protective barriers in and around building and preventive measures against safety hazards in work places and safety requirements for floor and wall opening, railings and toe-boards".

i) Hearing conservation:

Contractor shall ensure reasonable precautions are taken to avoid injury to the hearing of the employee. All noise levels shall be controlled within 85 dBA. Contractor shall identify noise areas where noise levels exceed prescribed safe level for arranging for appropriate Engineering revision. Where this is not feasible, appropriate Earmuffs or protectors shall be provided to workmen ensuring those wear them exposed to noise levels beyond safe levels. Periodic hearing acuity tests shall be conducted on such persons exposed to high noise levels to ensure that they do not suffer any hearing impairment` as per requirements of IS 8520: 1977

3.2 Manual handling & ergonomics:

- a) Contractor shall have procedures to identify risks involved in manual handling, operation and tasks. He shall ensure appropriate training to prevent any possible injury. Full use of mechanical aids shall be made to avoid risks arising out of such manual handling. Employees shall be adequately trained on such manual tasks and related safety precautions to reduce the risk of injury to personnel engaged in such work.
- b) Contractor shall undertake ergonomic study of manual operations to prevent musculoskeletal injury during manual handling, besides visual fatigue and mental stress giving considerations to matters such as seating, lighting and ventilation, etc.

4.0 FIRE PROTECTION AND PREVENTION:

4.1 General Requirements :

- a) Risk assessments shall be carried out to identify potentially vulnerable areas to provide sufficient quantities of correct type of extinguishers and ancillary equipment to deal with various types of fire hazards.
- b) Where required by the contract, Contractor shall provide appropriate type of extinguishers close to areas of fire hazard but not too close such that they are cut off from use during a fire. Water based extinguishers shall not be positioned close to or used on electrical equipment.
- c) Extinguishers shall be marked / labelled and recorded with location particulars in a register. They shall be inspected at monthly intervals to ensure they are in operable sound condition. There shall be a systematic plan for servicing, repairing and recharging fire extinguishers and for recording such dates on the register and equipment.
- d) The location of fire fighting equipment shall quickly and easily be identifiable especially in emergencies in a conspicuous manner painted as high as possible to identify the location of the extinguisher to prevent it from being obscured by machinery and goods stacked in front and to return the equipment to its location after emergency use in other locations. In order to ensure this, "Keep Clear" area shall be demarcated and maintained. Location plans of extinguishers and fire-fighting equipment shall be prominently displayed when desired by the Employer.

- e) SR and SA shall be trained on fire fighting techniques who shall co-ordinate and control fire protection and prevention programmes.
- f) Where required by contract, Contractor shall maintain alarm systems powered by mains and by battery for back up. Where required by the Contract, emergency lighting shall be provided to aid evacuation in poor lighting conditions following the alarm. The alarm system shall be made known to all employees.
- g) A clear written procedure for action in the event of fire should be produced. Fire teams and Hose teams shall be identified and their responsibilities during emergencies shall be detailed in writing. Personnel shall be trained on their fire duties and use of fire-fighting equipment. Regular drills shall be conducted to test procedures and to validate them. Fire instructions and emergency procedures shall be displayed throughout the premises. Emergency response procedures are detailed below under Clause 5.0.
- h) A means of escape shall be provided in all work areas and storages and maintained and kept free from obstruction. All exits shall be clearly marked and kept unlocked whilst the premises are in use. Escape routes shall be protected from fire.

#### 4.2 **Security :**

- a) Where required by the contract, Security shall do all that is reasonably practicable to ensure the safety of employees and property of the company in the face of accidents by fighting fires, and containing losses due to pilferage, theft, vandalism and industrial espionage both by employees external elements. Security personnel shall be appropriately competent, receive adequate safety training. Security shall routinely report on a standardised basis on aspects such as violation of fire-protection rules, use of alcohol and narcotic drugs, condition of security fencing, floodlighting and storage, etc.
- b) Where the project is located where a number of other companies are in operation, Contractor shall plan for mutual assistance programmes in cases of emergencies, as are practiced in the area in conjunction with Employer.
- c) Where common boundaries exist between companies, contractor in conjunction with Employer shall co-ordinate security control over common factors such as Floodlights, Fencing, and pipelines containing gas, fuel and electricity.
- d) Security shall be represented in Safety committee through a safety appointee nominated from the area.

#### 5.0 **EMERGENCY PLANNING / EMERGENCY RESPONSE (ER)**

- a) Contractor shall plan to deal with emergencies (ER) specific to the job site. ER shall be written and communicated to all employees. ER shall identify for the potential and responses to incidents and emergency situations and for preventing and mitigating the likely illness and injury that may be associated with them.

- b) The Contractor shall review his emergency preparedness and response plans and procedures in particular after occurrence of incidents or emergency operations.
- c) Contractor shall designate his emergency team with their duties during emergencies defined, including those of the hose teams, medical personnel, first-aiders and security. Contractor shall maintain a procedure as to how his emergency organisation shall liaise with Employer's representatives in ER.
- d) The Contractor shall also periodically test such emergency procedures by conducting Mock-drills and use the experience for updating the emergency Plan and for training the Employees on the perceived competence needs.
- e) The emergency Response Plan of the Contractor shall be under the control of the SR who shall be able to co-ordinate with Employer for liaising with Government agencies, neighbouring industries and community
- f) The plans shall be designed to allow people to work under disaster conditions when normal services such as telephone, water, light, power, transport and sanitation are not available and first aid and fire fighting facilities are not able to cope with sudden demand on services.
- g) The telephone numbers, ambulance, Police; Managers and Employer's key executives shall be prominently displayed in the identified Emergency Response Centre.

## 6.0 **PREMISES AND HOUSE -KEEPING**

### 6.1 **Orderly work-place**

Contractor shall maintain a well-managed safe working place in sound clean condition. Contractor shall ensure that there is a place for everything and everything is in its place so that optimum use is made of valuable floor space with commensurate cleanliness and reduced handling time. He shall ensure that his entire infrastructure including temporary and semi-temporary buildings are kept clean and have good repair.

### 6.2 **Good lighting (natural and artificial):**

Contractors shall provide lighting (natural or artificial) to enable that work processes are carried out safely. Artificial lighting shall be adequate especially in the nights and emergencies. The lumen levels shall meet the statutory requirements.

### 6.3 **Ventilation (natural and artificial):**

Contractor shall ensure that workplaces are ventilated with at least prescribed amount of clean or cleaned fresh air of a suitable temperature, especially where toxic or irritating substances are present such as welding, vehicle exhaust fumes, irritating dusts, organic solvents or any other inimical atmosphere creating health hazards or safety.

### 6.4 **Welfare and hygiene facilities:**

Contractor shall provide welfare facilities to ensure a high standard of cleanliness for all activities and rest. Contractor shall provide adequate facilities for his employees such as ablutions, toilets, change rooms, kitchens and cafeterias in a clean and hygienic state.

6.5 **Pollution to ground, air and water:**

Contractor shall strive to exceed established minimum performance norms in waste and pollution control. All drains shall be identified as clean water and foul water to aid non-armful disposal.

6.6 **Traffic routes and Aisles:**

Contractor shall arrange to separate pedestrian and vehicular including material handling equipment traffic wherever possible and maintain the routes clear of obstruction. To ensure safety of user's clear painted demarcation is encouraged as a discipline to be enforced.

6.7 **Stacking and storage practice:**

- a) Contractor shall ensure stacked material is bonded on a stable and level footing capable of carrying the mass of the stack. Adequate clearances shall be provided between the sides of the stack and top to facilitate unimpeded access to service equipment like overhead wiring, cranes, forklifts, fire fighting equipment and hoses. Circular items shall be sufficiently choked with wedges and not with odd bits of materials. Freestanding stacks of gunny bags and sacks such as cement bags shall be stacked to prescribed safe-stack heights with layers formed for stable bonding, preventing slippage causing accidents. Stacking against walls shall not be permissible.
- b) Contractor shall maintain the premises and surrounding areas in clean and clear manner with safe access and egress. There shall be sufficient and adequate storage racks, shelving, bins, pallets and material handling equipment to stack his construction materials such as pipes, structures and his construction enabling materials. Unwanted materials shall be promptly moved away for efficient material movement.

6.8 **Storage of Hazardous materials:**

- a) Hazardous materials shall be stored on solid bases. Solid bases shall include compacted earth, pallets, concrete or asphalt platforms or paving. Hazardous materials shall be stored, stacked and secured to prevent toppling, spillage or other unintended dislodgement. Aisles and clearances shall be as detailed under 6.6 above. Hazardous materials shall be stacked in such a manner that an observer standing in the aisle can read their labels and legends
- b) Each hazardous material contained shall be identified by a legible or legend as per governing statute, code or regulation. The label shall identify the item, quantity and appropriate warnings.
- c) Hazardous materials which if brought in contact with each other could react or pose equal or greater hazard than either material stored alone shall be stored at a distance not lesser than twenty feet apart.

- d) Warnings shall be posted and maintained in a legible condition at all access points clearly defining the specific hazardous nature of the stored materials such as "Corrosive", Flammable", "Explosive", "Oxidising", "Compressed gas" or other hazardous nature.
- e) Where hazardous materials are unloaded in Contractor's storage maintained at site in a semi-permanent installation, such installations shall be approved by relevant statutory bodies. Copies of licences for storage shall be lodged with Employer. The Containers and storages shall display quantities stored with name of the hazardous material and the UN Hazard classification label in prescribed colour code prominently painted in a conspicuous manner.
- f) Contractor shall inspect the hazardous storages and installations on a daily basis and shall undertake any requisite preventive action necessary to avoid safety risks

6.9 **Storage of flammable / explosive Materials:**

- a) Contractor shall secure flammable and / or explosive materials against accidental ignition.
- b) Storage facilities for flammable liquids such as Petrol, Diesel, Kerosene and Lubricants as well as the quantities stored shall meet the legal and statutory requirements. They shall be stored in approved fire-resistant rooms with a sump of sufficient volume to contain any spillage.
- c) The electrical fittings shall be flame -proof and on a strict maintenance schedule.
- d) Containers shall be appropriately bonded in receptacles into which low flash point fuel is decanted.

6.10 **Compressed gas cylinders**

Compressed gas cylinders shall be stored and secured in the upright position at safe distances shielded from welding and cutting operations. Compressed gas cylinders in storage shall be shut off and torches, hose and manifolds removed and capped. Cylinders shall be periodically checked for leakages. Storage shall meet requirements of Gas Cylinder Rules 1981. Compressed gas storages shall be provided with safety relief valves, safety valves and rupture disc to protect them from overpressures and shall be appropriately designed to ensure their continued availability in the face of process changes.

6.11 **Scrap and Refuse Bins-Removal System**

Contractor shall ensure that he has sufficient waste bins that are identified for different wastes and maintained in clearly demarcated areas. Wastes with oily or other ignitable materials such as Oily cotton wastes and Hand gloves shall be stored separately with covers to prevent fires and shall be made of metal. Different Wastes shall be segregated and stored separately and disposed off. They shall be emptied at routine intervals to prevent that they do not overflow with wastes.

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## Section 2 G – List of Approved makes

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## SECTION 2 G - LIST OF APPROVED MAKES

### 1.0 LT and LT cables

1.1	M/s Asian Cable corporation Ltd./RPG	Mumbai
1.2	M/s Cables Corporation of India	Mumbai
1.3	M/s Delton cables Ltd.	Delhi
1.4	M/s Fort Gloster Industries Ltd.	Kolkatta
1.5	M/s Universal Cables Ltd.	Mumbai
1.6	M/s Finolex Cables	Pune
1.7	M/s Polycab Industries	Mumbai
1.8	M/s Nicco Corporation Ltd.	Kolkatta
1.9	M/s Uniflex Cables	Umbargaon
1.10	M/s Incaab	Kolkatta

### 2.0 Cable Jointing Kits

	Mahindra and Mahindra (M-seal)	Mumbai
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### 3.0 Push Buttons and Indicating Lamps

3.1	M/s. L&T
3.2	M/s. BCH
3.3	M/s. Simens
3.4	M/s. Kaycee

### 4.0 Steal and Bolts and Spring Washer

	M/s. GKW
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### 5.0 Steel & Steel Products and CGI Sheets

5.1	Tata Iron and Steel Ltd.
5.2	Sail

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## Section 2H – Bid Purpose Drawings

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**Bhutan Power Corporation Limited  
Distribution and Customer Services Department  
Urban Electrification Division  
Thimphu: Bhutan**



**Specification No. BPC/DCSD/UED/C-20**

**Bidding Document**

**For**

**Improvement and Up-gradation of Samdrup  
Jongkhar Town – Phase I**

**Volume II Part-I – Form and GTPs**

December 2011

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## Section 3A – FORMS

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## 1. FORM OF BID

NAME OF CONTRACT: Improvement and Up-gradation of Samdrup Jongkhar  
Town – Phase I

To: General Manager,  
Distribution & Customer Services Department,  
Bhutan Power Corporation Limited,  
Thimphu: Bhutan.

Gentlemen,

1. Having examined the Condition of Contract, Specification, Drawings and Bill of Quantities and Addenda for the execution of the above-named works, we, the undersigned, offer to execute and complete such works and remedy any defects therein in conformity with the Condition of Contract, Specification, Drawings, Bill of Quantities, Annexure and Addenda for the sum of *(Please do not fill the amount/any monetary figure for the bid form relating to the technical bid)*

(\_\_\_\_\_)

as specified in the Appendix to Bid or such other sums as may be ascertained in accordance with the said Conditions.

2. We undertake, if our Tender is accepted, to commence the Works as soon as is reasonably possible after the receipt of the Engineer's notice to commence, and to complete the whole of the Works comprised in the Contract within the time stated in the Appendix to Tender.
3. We agree to abide by this Tender for the period of 120 days from the date fixed for receiving the same and it shall remain binding upon us and may be accepted at any time before the expiration of that period.
4. The Bid is submitted under our covering letter reference \_\_\_\_\_ dated \_\_\_\_\_ and the completed Bid documents and other information, required by the Instruction to Bidders, which are enclosed therewith all of which shall be read and construed as forming part hereof.
5. Unless and until a formal Agreement is prepared and executed this Tender, together with your written acceptance thereof, shall constitute a binding contract between us.

6. We understand that you are not bound to accept the lowest or any tender you may receive.

Dated this \_\_\_\_\_ Day of \_\_\_\_\_ 2011

Signature \_\_\_\_\_ in the capacity of \_\_\_\_\_

Duly authorized to sign tenders for and on behalf of \_\_\_\_\_

(IN BLOCK CAPITALS)

Address \_\_\_\_\_

Witness \_\_\_\_\_

Address \_\_\_\_\_.

Occupation \_\_\_\_\_

## 2. APPENDIX TO BID

The bidders shall fill the Appendix to Bid.

	<u>Sub clause</u>	
Amount of Performance Security	10.1	Ten (10) percent of the contract price
Time for Completion	25.1	Fourteen (14) months from the date of handing over the site
Amount of Liquidated Damages	27.1	0.1% for every day of delay of the price of each package
Limit of Liquidated Damages	27.1	Ten (10) percent of the total contract Price of each package
Defects Liability Period	1.1.11	One (1) year from the taking over of the works
Retention Money	33.7	Ten(10) percent of the interim payment certificates

**3. FORM OF BID SECURITY (BANK GUARANTEE)**

**WHEREAS,** \_\_\_\_\_ [Name of Bidder] (hereinafter called “the Bidder”) has submitted his bid dated \_\_\_\_\_ [date] for the improvement and up-gration of Samdrup Jongkhar town – Phase (hereinafter called “ the Bid”).

KNOW ALL MEN by these presents that We \_\_\_\_\_ [Name of Bank] of \_\_\_\_\_ [Name of Country] having our registered office at (hereinafter called the “ Bank”) are bound unto the sum of \_\_\_\_\_ [Mention amount in figure and in words] for which payment well and truly to be made to the said Employer, the Bank binds himself, his successors and assigns by these presents.

SEALED with the Common Seal of the said Bank this \_\_\_\_\_ day of 2011.

**THE CONDITIONS of this obligation are:**

If the Bidder withdraws his Bid during the period of Bid validity specified in the Form of Bid: or

If the Bidder does not accept the correction of arithmetical errors of his bid price in accordance with the Instruction of Bidders: or

If the Bidder having been notified of the acceptance of his Bid by the Employer during the period of bid validity:

- a) fails or refuses to execute the Form of Agreement in accordance with the Instruction to Bidders, if required; or
- b) fails or refuses to furnish the Performance Security, in accordance with the Instruction to Bidders,

we undertake to pay to the Employer up to the above amount upon the receipt of his first written demand, without the Employer having to substantiate his demand, provided that in his demand the Employer will note that the amount claimed by him is due to him owing to the occurrence of one or both of the two conditions, specifying the occurred condition or conditions.

This Guarantee will remain in force up to and including the date \_\_\_\_\_ days beyond the period of bid validity as stated in the instruction to bidders or as it may be extended by the Employer, notice of which extensions(s) to the Bank is hereby waived. Any demand in respect of this Guarantee should reach the Bank not later than the above date.

DATE \_\_\_\_\_ SIGNATURE OF THE BANK \_\_\_\_\_

WITNESS \_\_\_\_\_ SEAL \_\_\_\_\_  
(Signature, Name and Address)

#### 4. AGREEMENT (To be used later)

This Agreement made the \_\_\_\_\_ day of \_\_\_\_\_ between Bhutan \_\_\_\_\_ (hereinafter called “ the Employer”) of the one part \_\_\_\_\_ (hereinafter called “the Contractor”) of the other part.

**Whereas** the Employer is desirous that certain Works should be executed by the Contractor namely \_\_\_\_\_ thereof and has accepted a bid by the Contractor for the execution and completion of such Works and the remedying of any defects therein in the sum of \_\_\_\_\_ (herein called the “Contract Price”)

**Now it is agreed** as follows:

1. In this Agreement words and expressions shall have the same meanings as are respectively assigned to them in the Conditions of Contract hereinafter referred to.
2. The contract shall consist of this contract agreement form and the following documents and the drawings, specifications and other documents referred to therein (herein called the “Contract Documents”), all of which by this reference are incorporated herein and made part thereof. The following document shall be deemed to form and be read and construed as part of this Agreement, viz:
  - i. This Agreement
  - ii. The Letter of Acceptance;
  - iii. The said Bid along with clarifications and correspondence from the date of Bid Opening to signing of Contract Agreement;
  - iv. The Technical Specifications and the Scope of Works as indicated in BPC’s bid document read along with all amendments thereof;
  - v. The Drawings; and
  - vi. The Priced Bill of Quantities.
  - vii. Any other document forming Part of the Contract.
3. In consideration of the payments to be made by the Employer to the Contractor as hereinafter mentioned the Contractor hereby covenants with the Employer to execute and complete the Works and remedy any defects therein in conformity in all respects with the provisions of the Contract.
4. The Employer hereby covenants to pay the Contractor in consideration of the execution and completion of the Works and the remedying of defects therein the Contract Price or such other sum as may become payable under the provision of the Contract at the times and in the manner prescribed by the Contract , the total estimated contract price and details of which are indicated in the Contract Price Schedule enclosed, all the unit rates therein being firm and not subject to any Price Variation provisions of the Original Contract.
5. Any notice under the contract shall be in the form of a letter, or facsimile. Notices to either party shall be given to the following address, unless subsequently modified by either party in writing at the following address:

**Client's Address**

The General Manager,  
Distribution and Customer Services Department  
Bhutan Power Corporation Limited  
Post Box 580  
Thimphu: Bhutan

Tel: +975-2-333577 (Direct) /327529

Fax: +975-2-322279

And notice to the Contractor shall be properly addressed to:

Tel:

Fax:

Email:

**IN WITNESS WHEREOF**, the parties hereto have caused the agreement to be signed in their respective names as on the date written.

SIGNED, SEALED AND DELIVERED

*Binding Signature of Employer*

*Binding Signature of Contractor*

*Signed in the presence of:*

**Witness of Employer**

**Witness of Contractor**

**5. PERFORMANCE BANK GUARANTEE (To be used latter)**

To: \_\_\_\_\_(Name of Employer)  
\_\_\_\_\_( Address of Employer)

WHEREAS \_\_\_\_\_[Name and address of Contractor] (hereinafter called “ the Contractor” ) has undertaken, in pursuance of Contract No. \_\_\_\_\_ dated \_\_\_\_\_ to execute the complete works related to supply, construction, erection, testing and commission of UG cable network and testing and commissioning of packaged substation (hereinafter called “the Contract”);

AND WHEREAS it has been stipulated by you in the said contract that the Contractor shall furnish you with a Bank Guarantee by a recognized Bank for the same specified therein as security for compliance with his obligations in accordance with the Contract.

AND WHEREAS we have agreed to give the Contractor such a Bank Guarantee;

NOW THEREFORE, we hereby affirm that we are the Guarantor and responsible to you, on behalf of the Contractor, up to a total of \_\_\_\_\_( amount of Guarantee) \_\_\_\_\_( in word), such sum being payable in the currency in which the Contract Price is payable, and we undertake to pay you , upon your first written demand and without cavil or argument, any sum or sums within the limits of \_\_\_\_\_(amount if Guarantee) as aforesaid without your needing to prove or to show grounds or reasons for your demand for the sum specified therein.

We hereby waive the necessity of your demanding the said debt from the Contractor before presenting us with the demand.

We further agree that no change or addition to or other modification of the terms of the Contract or of the Works to be performed there under or of any of the Contract documents which may be made between you and the Contractor shall in any way release us from any liability under this guarantee, and we herby waive notice of any such change, addition or modification.

This guarantee shall be valid until the date of taking over of the works and release of Performance Certificate by the Employer. A separate Bank Guarantee covering defects liability period will be necessary.

SIGNATURE AND SEAL OF THE GUARANTOR \_\_\_\_\_  
NAME OF BANK \_\_\_\_\_  
ADDRESS \_\_\_\_\_  
DATE \_\_\_\_\_

**6. BANK GUARANTEE FOR ADVANCE PAYMENT (To be used latter)**

To: \_\_\_\_\_(Name of Employer)  
\_\_\_\_\_(Address of Employer)  
\_\_\_\_\_(Name of the Contract)

Gentlemen:

In accordance with the provisions of the Terms & Condition of Contract, \_\_\_\_\_[Name and address of Contractor] (hereinafter called “the Contractor”) shall deposit with the \_\_\_\_\_(name of Employer), a bank guarantee for advance under the said Clause of the Contract in an amount of \_\_\_\_\_( amount of Guarantee) \_\_\_\_\_( in words).

We, the \_\_\_\_\_( bank or financial institutions), as instructed by the Contractor, agree unconditionally and irrevocably to guarantee as primary obligator and not as Surety merely, the payment to \_\_\_\_\_(name of Employer), on his first demand without whatsoever right of objection on our part and without his first claim to the Contractor, in the amount not exceeding \_\_\_\_\_(amount of Guarantee) \_\_\_\_\_ ( in words).;

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

This guarantee shall be valid for the whole contract period and until the advance payments are fully recovered.

This guarantee shall remain valid and in full effect from the date of the advance payment under the Contract until \_\_\_\_\_(name of Employer), received full repayment of the same amount from the Contractor.

SIGNATURE            AND            SEAL            OF            THE            GUARANTOR  
\_\_\_\_\_

NAME OF BANK \_\_\_\_\_  
ADDRESS \_\_\_\_\_  
DATE \_\_\_\_\_

**7. DEVIATIONS FROM AND EXCEPTION TO BID DOCUMENT**

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 compliant with the content and intent of the Bid Document except in respect of deviations and exceptions 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 deviations from the Bid Document is a complete record of such deviations.

In case NO DEVIATION is mentioned here and deviation of clauses/specification is mentioned else where, then it will be taken as a deviation.

Signature of Bidder: .....

Place & Date .....

**8. PROPOSED JV PARTNER**

Bidder shall submit a list of all JV partners they propose to employ together with a brief description of the Plant of Works they propose to hire.

Equipment they propose to hire	Proposed JV Partner with details of JV agreement and responsibility of each partner.

Signature of Bidder: .....

Place & Date: .....

**9. CONTRACTOR'S KEY PERSONNEL**

The Bidder shall submit an organization structure chart and summaries below the names of all key personnel whom they or their major sub-contractors propose to employ on the works together with a brief resume of their qualification and experience. These persons shall be available at the site and changes can be done only after due approval of BPC.

Organization Structure Ref. No.	Position	Name	CV or Resume of previous Experience, Responsibilities and Employer

The duties and responsibilities of the above personnel should be shown on the organization structure chart (showing head office and site responsibility of key personnel). Site and Office organ gram shall be submitted.

Signature of Bidder: .....

Date: .....

**10. BIDDER’S EXPERIENCE**

Bidder shall state below the relevant project experience.

Items/Group of Items	Details of Bidder’s Experience	Detail of JV/Sub-Contractor’s Experience

Signature of Bidder: .....

Date: .....

**11. QUALIFICATION REQUIREMENT OF BIDDER'S EXPERIENCE**

Bidder shall furnish this information for such works which have been carried out during last ten (10) years and which are under successful operation for at least five years. Supporting documents shall be enclosed in respect of minimum quantum of works as per Qualification criteria given in Section 1 of this bidding document.

**PAST EXPERIENCE OF BIDDER AS ERECTOR**

Sl.#	Name & Address of Clients	Name of Work	Voltage Level	Details of work carried out	Contract period	Start date	End date	Value of Works

Performance certificates to be enclosed

Signature of Bidder: .....

Date: .....

**12. STATUS OF CONTRACTOR'S IN PROGRESS**

Give full information of all the uncompleted works on the Contract now in progress.

Name of Project	Country	Employer/Clients	Contract Amount (Currency)	Amount Completed (Currency)	Date of Commencement	Schedule date of completion
TOTAL						

Signature of Bidder: .....

Date: .....

**13. FINANCIAL STATUS OF BIDDER**

Fill in the blanks for the last five (3) years in the original currency and also attach copies of the Balance Sheets for the se years.

- 1. Capital: \_\_\_\_\_
- 2. Total current assets: \_\_\_\_\_
- 2.1 Total cash and deposit: \_\_\_\_\_
- 2.2 Deposits with bids or otherwise as guarantees (due within 90 days) \_\_\_\_\_
- 2.3 Accounts receivable from completed contracts (due within 90 days) \_\_\_\_\_
- 2.4 Amount receivable after deducting retention from uncompleted contracts (due within 90 days) \_\_\_\_\_
- 2.5 Stocks and bonds at present market value \_\_\_\_\_
- 2.6 Buildings and loans at present market value \_\_\_\_\_
- 2.7 Life insurance at cash surrender value ( for an individual or partnership only) \_\_\_\_\_
- 2.8 Other current assets \_\_\_\_\_
- 3. Total current liabilities \_\_\_\_\_
- 3.1 Notes payable ( to banks, regular and for certified checks and to others) \_\_\_\_\_
- 3.2 Accounts payable \_\_\_\_\_
- 3.3 Other current liabilities \_\_\_\_\_
- 4. Total assets \_\_\_\_\_
- 5. Total liabilities \_\_\_\_\_
- 6. Current credit resources \_\_\_\_\_

- 7. Net worth \_\_\_\_\_
- 8. Total profit before tax \_\_\_\_\_
- 9. Turnover in the previous financial years \_\_\_\_\_
- 10. Amount of balance \_\_\_\_\_
- 11. Date of balance \_\_\_\_\_
- 12. Bank references and address \_\_\_\_\_
- 13. Bonding capacity List names of institutions and  
bondable amounts: attach  
respective letters from sureties

Institution	Currency
_____	_____
_____	_____
_____	_____
_____	_____
_____	_____

Remarks:

Item 1: The amount for share capital shall include retained earnings.

Item 6: The maximum current credit resources the Bidder's bank(s) available for the fulfillment of Bidder's obligation for the Project if the Bidder is awarded the contract shall be stated and certified by the Bank.

Item 13: Attach respective letters from the banks.

Signature of Bidder: .....

Date: .....

Signature of the Auditor: .....

Place & date: .....

## **14. IMPLEMENTATION METHODOLOGY**

### **WORK SCHEDULE**

The bidder shall provide a detailed programme covering installation and commissioning phases of the project. This programme shall conform to the key dates in the Bidding Document.

The programme shall include a bar chart of the principal quantities of work forecast for execution monthly, and payments expected to be made in connection herewith in accordance with the Condition of Contract.

The programme shall be made using a Project Management software like Microsoft Project and submit with the bid. The Bidder shall also submit soft copy of the detail schedule to the Engineer/Employer for approval after 15 days of the signing of the contract agreement.

**15. Equipments and Tools**

a) List of main equipment and plants available with the contractor.

Item No.	Description	Quantity Capacity	Place where they are	Present value	Remarks Hire/Purchased

b) List all the equipments and plants to be made available for Construction and Erection in case you are awarded the Contract.

Item No.	Description	Quantity Capacity	Place where they are	Present value

## **16. INTEGRITY PACT**

### **1 General**

Whereas .....representing ....., the Royal Government of Bhutan, hereafter referred to as the Employer on one part and ..... representing the ..... on the other part, hereby execute this agreement as follows:

*This agreement should be part of the tender document, which shall be signed and submitted along with the tender document. The head of the employing agency/or his authorized representative should be the signing authority. For the Bidders, the Bidder himself or his authorized representative must sign the Integrity Pact (IP). If the winning Bidder had not signed during the submission of the bid, the tender shall be cancelled.*

### **2 Objectives**

Now, therefore, the Employer and the Bidder agree to enter into this pre-contract agreement, hereinafter referred to as Integrity Pact, to avoid all forms of corruption by following a system that is fair, transparent and free from any influence/unprejudiced dealings prior to, during and subsequent to the currency of the contract to be entered into with a view to:

- 2.1 Enabling the Employer to obtain the desired works at a reasonable and competitive price in conformity with the defined specifications of the goods and 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 and the Employer will commit to prevent corruption, in any form by their officials by following transparent procedures.

### **3 Commitments of the Employer:**

The Employer commits itself to the following:

- 3.1 The Employer undertakes that no official 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, bid evaluation, contracting or implementation process related to the Contract.

3.2 The Employer further confirms that its officials has not favored any prospective Bidder in any form that could afford an undue advantage to that particular Bidder during the tendering stage and will further treat all Bidders alike.

3.3 All the officials of the Employer shall report to the Head of the employing agency or an appropriate Government office any attempted or completed violation of the clauses 3.1 and 3,2 .

3.4 Following report on violation of clauses 3.1 and 3.2 by official (s), through any source, necessary disciplinary proceedings, or any other action as deemed fit, including criminal proceedings may be initiated by the Employer and such a person shall be debarred from further dealings related to the contract process. In such a case while on enquiry is being conducted by the Employer the proceedings under the Contract would not be stalled.

#### **4 Commitments of Bidders**

The Bidder commits himself to take all measures necessary to prevent corrupt practices, unfair means and illegal activities during any stage of his bid or during any pre-contract or post-contract stage in order to secure the contract or in furtherance to secure it and in particular commits himself to the following:

4.1 The Bidder will 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, or to any person, organization or third party related to the contract in exchange for any advantage in the bidding, evaluation, contracting and implementation of the Contract.

4.2 The Bidder further undertakes that he has not given, offered or promised to give, directly or indirectly 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 or otherwise in procuring the Contract or forbearing to do or having done any act in relation to the obtaining or execution of the Contract or any other contract with the Government for showing or forbearing to show favor or disfavor to any person in relation to the Contract or any other contract with the Government.

4.3 The Bidder will not collude with other parties interested in the contract to preclude the competitive bid price, impair the transparency, fairness and progress of the bidding process, bid evaluation, contracting and implementation of the contract.

4.4 The Bidder, either while presenting the bid or during pre-contract negotiations or before signing the Contract, shall disclose any payments he has made, is committed to or intends to make to officials of the Employer or their family members, agents, brokers or any other intermediaries in connection with the Contract and the details of services agreed upon for such payments.

## **5 Sanctions for violation**

The breach of any aforesaid provisions or providing false information by the employers, including manipulation of information by evaluators, shall face administrative charges and penal actions as per the existing relevant rules and laws.

The breach of the Pact or providing false information by the Bidder or any one employed by him or acting on his behalf (whether with or without the knowledge of the Bidder) or the commission of any offence by the Bidder or any one employed by him or acting on his behalf, shall be dealt with as per the provisions of the Penal Code of Bhutan, 2004, and the Anti-Corruption Act, 2006.

The Employer/relevant agency shall also take all or any one of the following actions, whenever required:

5.1 To immediately call off the pre-contact negotiations without assigning any reason or giving any compensation to the Bidder. However, the proceedings with the other Bidder(s) would continue.

5.2 To immediately cancel the Contract, if already awarded/signed, without giving any compensation to the Bidder.

5.3 The Earnest Money/Security Deposit/Performance bond shall stand forfeited.

5.4 To recover all sums already paid by the Employer.

5.5 To encash the advance bank guarantee and performance bond/warranty bond, if furnished by the Bidder, in order to recover the payments, already made by the Employer, along with interest.

5.6 To cancel all or any other Contracts with the Bidder.

5.7 To debar the Bidder from entering into any bid from the government of Bhutan as per the Debarment Rule.

## **6 Conflict of Interest**

6.1 A conflict of interest involves a conflict between the public duty and private interests (for favor or vengeance) of a public official, in which the public official has private interest which could improperly influence the performance of their official duties and responsibilities. Conflict of Interest would arise in a situation when any concerned members of both the parties are related either directly or indirectly, or has any association or had any confrontation. Thus, conflict of interest of any tender committee member must be declared in the prescribed form (attached).

6.2 The Bidder shall not lent to or borrow any money from or enter into any monetary dealings or transactions, directly or indirectly, with any committee member, and if he does so, the Employer shall be entitled forthwith to rescind the Contract and all other Contracts with the Bidder.

## **7 Examination of Books of Accounts**

7.1 In case of any allegation of violation of any provisions of this Integrity Pact or payment of commission, the Employer/authorized persons or relevant agencies shall be entitled to examine the Books of Accounts of the Bidder and the Bidder shall provide necessary information of the relevant financial documents and shall extend all possible help for the purpose of such examination.

## **8 Monitoring and Arbitration**

8.1 The respective procuring agency shall be responsible for monitoring and arbitration of IP as per the Procurement Rules.

## **9 Legal Actions**

9.1 The actions stipulated in this Integrity Pact are without prejudice to any other legal action that may follow in accordance with the provisions of the extant law in force

relating to any civil or criminal proceedings.

**10 Validity**

10.1 The validity of this Integrity Pact shall cover the tender process and extend until the completion of the Contract to the satisfaction of both the Employer and the Bidder.

10.2 Should one or several provisions of this Pact turn out to be invalid; the remainder of this Pact shall remain valid. In this case, the parties will strive to come to an agreement to their original intentions.

We, hereby declare that we have read and understood the clauses of this agreement and shall abide by it. Further, the information provided in this agreement are true and correct to the best of our knowledge and belief.

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

.....

.....

**EMPLOYER**

**BIDDER**

Witness:

Witness

1. \_\_\_\_\_

1. \_\_\_\_\_

2. \_\_\_\_\_

2. \_\_\_\_\_

**Legal Officer/Internal Auditor**

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## Section 3B – Guaranteed Technical Particulars

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**SCHEDULE -1**

**GUARANTEED TECHNICAL PARTICULARS FOR XLPE CABLES**

<b>Sr. No.</b>	<b>Description</b>	<b>Unit</b>	<b>Particulars</b>
1.0	Name of manufacturer and country		
2.0	Applicable standards		
3.0	Rated voltage	V	
4.0	<u>Conductor</u>		
4.1	Material		
4.2	Cross sectional area	mm <sup>2</sup>	
4.3	Whether stranded	Yes/No	
5.0	<u>Insulation</u>		
5.1	Material		
5.2	Thickness	mm	
6.0	<u>Inner sheath</u>		
6.1	Material		
6.2	Whether extruded or wrapped ?		
6.3	Thickness	mm	
7.0	<u>Outer Sheath</u>		
7.1	Material		
7.2	Thickness	mm	
8.0	Material of armour		
9.0	Whether round wire or tape ?		
10.0	Details of screen, if any		
11.0	Total overall diameter of cable	mm	
12.0	DC resistance at 20°C	ohms/km	
13.0	<u>Test voltage</u>		
13.1	One minute power frequency withstand voltage	kV	
13.2	Impulse withstand voltage	kVp	

**SCHEDULE -1**

GUARANTEED TECHNICAL PARTICULARS FOR XLPE CABLES

<b>Sr. No.</b>	<b>Description</b>	<b>Unit</b>	<b>Particulars</b>
13.3	Water immersion test voltage	kV	
14.0	Type of cable end sealing		
15.0	<u>Cable drums</u>		
15.1	Dimensions	mm	
15.2	Weight	kg	
15.3	Nominal length per drum	m	

Bidder shall furnish the above data for each rating/size of MV/ LV Cable and control cable

Signature : \_\_\_\_\_

**Bhutan Power Corporation Limited  
Distribution and Customer Services Department  
Urban Electrification Division  
Thimphu: Bhutan**



**Specification No. BPC/DCSD/UED/C-20**

**Bidding Document**

**For**

**Improvement and Up-gradation of Samdrup  
Jongkhar Town – Phase I**

**Volume II Part-2 – Price Schedule**

December 2011

## **SCHEDULE OF PRICES**

### **Preamble:**

1. The Contract is of item rate turnkey in nature and includes the definitive engineering and design that shall ultimately define actual quantities of work.
2. The provisional quantities of various items of civil works like excavation/ filling, foundations, supply and erection of steelwork, laying of underground HT & LT cables etc. are given in the price-schedule. However, the quantities may vary consequent to actual execution of the work. The payment shall be made for the actual quantities used for various items. For all items especially cables etc., after the award of the work, the contractor shall assess the required quantities and shall procure the requisite quantities only so as to minimize the stores and spares. BPC will take back only minimum spares.
3. Where the unit rates have been asked in the price schedule, the quantity variation may not be limited to 20% and the unit rates will govern for the actual quantity of work and no price variation will be permitted. For items where quantity is mentioned as 'LOT', is deemed that the Contractor has included the all inclusive price, which will be on lumpsum basis, and the total payment for any LOT item shall not exceed the amount quoted in the Bid. Contractor shall submit the list of items considered for the LOT with breakup of prices in the Bid.
4. It shall be a condition of this contract that the all-inclusive rates quoted in Schedule of Rates / Prices shall not be varied for reasons of change in respective quantities.
5. Further, it shall also be an important condition of this contract that there shall not be any change in Unit Rates of items consequent to revision of labour rates, fuel rates etc. by the Government of Bhutan.
6. The supply rate against each item shall be an all-inclusive rate, and be inclusive of supply, freight, transport, insurance. The Bidder shall indicate the all-inclusive rate separately for each item. Further, the all-inclusive unit rates shall be on FAS basis inclusive of ex-works price, packing and forwarding charges, railway freight, transport charges to actual work site, storage where necessary, charges for transit insurance, insurance of material/ goods at site. Bidder shall indicate Bhutan Sales Tax(BST) and Customs Duty(CD) applicable on the item separately.
7. All labour, supervision, inspection, testing and commissioning costs should be covered in Schedules for laying the UG cables. The charges/ expenses to be incurred on testing and commissioning of the entire system as a whole shall be included in the prices for individual activities.
8. The total price for each activity should cover all costs and expenses required for supply, delivery, storage, erection, testing, commissioning and maintenance of works together with all risks, liabilities, contingencies, insurances and obligations imposed and implied by the Contractor.
9. Bidder shall enter prices in relevant schedules for the supply of specified spares to site. These prices will be considered during bid evaluation.

10. All items of work specified in the specifications may not have been included in the price-schedule. The items of work not specifically called for in the Schedules are deemed to have been covered under the items called for, to leave the works complete, as per the specifications. The rate quoted by the Contractor shall be deemed to be all inclusive, to cover the smaller items specified but not included in the Price-Schedule. In case if any major item has been missed out in the schedule, the bidders shall make a mention of such item separately in the respective schedule, with the cost of carrying out the works.
11. In addition to the points stipulated/ highlighted in these clauses, all the conditions mentioned in the specifications, pertaining to measurement of quantities and unit rates of scheduled items shall apply.
12. It is deemed that the Bidder has understood the site conditions, environment, transport facilities, soil data etc. while preparing the price schedule and has adequately provided for them in his quoted prices. No claims of extra compensation will be payable for items and situations not foreseen and not incorporated by him in the schedules.
13. The wording under "Description" in the schedules is for subject matter guidance only. The Bidder's price shall include separately all works as specified in the specifications and drawings and all contractual obligations whether specifically mentioned or not.
14. The Bidder shall, if so desired by the Employer/Engineer, furnish at any stage of the bidding or Contract execution, break-up of prices considered for any or all items covered in various activities.
15. The contractor shall be paid for the foundations and other RCC items of work to suit actual soil characteristics as per the Unit Rates of individual items like ordinary concrete, steel reinforcement bars, excavation etc, based on the actual quantities.
16. The rates for excavation shall be deemed to include execution of all items mentioned in the specifications like earth work for casting of foundations, benching and back filling, compacting, leveling, de-watering etc., It also includes cost of shoring and shuttering wherever used. The rates for concreting shall together cover cost of all materials for concreting, forming including form boxes, casting concrete, curing and also cost of all materials related with the item.
17. Unit rates for reinforcement shall include supply, cutting, bending, tying, properly placing, providing lap and every other work needed for casting of the concrete, as specified. Similarly the Rates for other items like stone masonry revetment shall be deemed to be all-inclusive.
18. Adjustment of Prices not in the schedule.

**a) For Supply**

If the rates contained in the Schedules are not directly applicable to the specific work in question, suitable rates shall be established by the Engineer reflecting the level of pricing in the Schedule of Prices.

Where the rates are not contained in the said Schedule, the amount shall be such as is in all the circumstances reasonable. Else the rates shall be derived based on joint observation of cost and the payment shall be made on the basis of quotation or the actual invoices from the manufacturer plus 20% (Twenty percent) towards Contractors overheads & profit, including taxes and deductions.

**b) For Erection & Civil Works**

“The determination of rates for the erection and civil variation shall be based on the following”:

- i. Any item of the work, for which the unit rate is available in the contract (with or without specified quantity), shall be valued using the unit rate in the contract, irrespective of the quantity of the work.
- ii. If any altered or substituted work includes any item/work for which no rate is specified in the contract, the rate for such item/work shall be derived from the rate available in the contract for similar items based on appropriate measures like weights, volume, etc. as applicable.
- iii. If any altered or substituted work includes any item/work for which no rate is specified in the contract and the rate can not be derived as indicated in (ii) above, then the rate of such item of work shall be worked out based on the rates available for such item in BSR 2009 (or latest BSR), if applicable in BSR 2009, the cost index on BSR 2009 being determined by the ratio of the value of the contract price for similar works (using the original estimated quantities in the contract) to the value of these similar works of the contract with BSR 2009 rates.
- iv. For deriving rate of those items, which do not exist in BSR 2009 (or latest BSR) or in the contract cannot be derived as indicated above, “similar class of work” shall be interpreted as items having similar procedure of working. The rates shall be derived by adding/deducting the additional/reduction material/labour components involved in the BSR 2009 and worked out as per the procedure provided in (iii) above.
- v. If the items altered/substituted works do not fall under all the above categories, the rates shall be fixed by the Engineer, on the basis of the other rates in the contract with proper rate analysis and/or using any other reasonable means. This shall be based on the joint observation of the cost for the actual payment made for such works plus 20% overhead and profit.

## SUMMARY OF PRICES

Description	Price in Ngultrum/ Rupees
Total Schedule 1	
Total Schedule 2	
Total Schedule 3	
<b>GRAND TOTAL</b>	

Amount in words: