# E-T E N D E R  S P E C I F I C A T I O N

| E- TENDER SPECIFICATION NUMBER |
|---|
| BHE/PW/PUR/TLRPT-CPS/2630 |

FOR

**PROVIDING CONSTRUCTION POWER SYSTEM INCLUDING DESIGN, PROCUREMENT OF EQUIPMENT, INSTALLATION INCLUDING CIVIL WORKS, ERECTION,TESTING & COMMISSIONING, OPERATION & MAINTENANCE COMPRISING OF 6.6/11kV SUBSTATION, 11 KV POWER DISTRIBUTION MAIN SYSTEM , LINE, AND 11/0.433 KV PACKAGE SUBSTATIONS AND ASSOCIATED ITEMS AS DETAILED IN TECHNICAL SPECIFICATION FOR 2X660MW NTPC TALCHER PROJECT, ORISSA**

## VOLUME I – TECHNICAL BID

THIS TENDER SPECIFICATION CONSISTS OF:

| Notice Inviting Tender | |
|---|---|
| Volume-IA | Technical Conditions of Contract |
| Volume-IB | Special conditions of Contract |
| Volume-IC | General conditions of Contract |
| Volume-ID | Forms & Procedures |
| Volume-II | Price Bid |

Bharat Heavy Electricals Limited
(*A Government of India Undertaking*)
Power Sector - Western Region
345-Kingsway, Nagpur-440001

| CONTENTS | | |
|---|---|---|
| Volume No | Description | Hosted in website ww.bhel.com (Briefly) and detailed in BHEL e-Procurement Portal as files titled |
| NIL | Tender Specification Issue Details | (Part of Vol-I-A-2630) |
| NIL | Notice Inviting Tender | (Part of Vol-I-A-2630) |
| I-A | Technical Conditions of Contract | Vol-I-A-2630 |
| I-B | Special Conditions of Contract | (Part of Vol-I-BCD-2630) |
| I-C | General Conditions of Contract | (Part of Vol-I-BCD-2630) |
| I-D | Forms & Procedures | (Part of Vol-I-BCD-2630) |
| II | Price Bid Specification as specified in E-Procurement Portal | Volume-II-PRICE-BID-2630 |

# E-T E N D E R  S P E C I F I C A T I O N

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| BHE/PW/PUR/TLRPT-CPS/2630 |

FOR

PROVIDING CONSTRUCTION POWER SYSTEM INCLUDING DESIGN, PROCUREMENT OF EQUIPMENT, INSTALLATION INCLUDING CIVIL WORKS, ERECTION,TESTING & COMMISSIONING, OPERATION & MAINTENANCE COMPRISING OF 6.6/11kV SUBSTATION, 11 KV POWER DISTRIBUTION MAIN SYSTEM , LINE, AND 11/0.433 KV PACKAGE SUBSTATIONS AND ASSOCIATED ITEMS AS DETAILED IN TECHNICAL SPECIFICATION FOR 2X660MW NTPC TALCHER PROJECT, ORISSA

EARNEST MONEY DEPOSIT: Refer Notice Inviting Tender

LAST DATE FOR TENDER SUBMISSION Refer Notice Inviting Tender

THESE TENDER SPECIFICATION DOCUMENTS CONTAINING VOLUME-I AND VOLUME- II ARE ISSUED TO:

M/s. ……

……

PLEASE NOTE:
THESE TENDER SPECS DOCUMENTS ARE NOT TRANSFERABLE.

For Bharat Heavy Electricals Limited

GM (Purchase)
Place: Nagpur
Date:

# 2630

# NOTICE INVITING TENDER

Bharat Heavy Electricals Limited

Date: 24/08/2022

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# *NOTICE INVITING TENDER (NIT)*

# NOTE: BIDDER MAY DOWNLOAD FROM WEB SITES

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**To,**

Dear Sir/Madam,

**Sub : NOTICE INVITING E-TENDER**

Sealed offers in two part bid system (National competitive bidding (NCB) ~~or International Competitive Bidding (ICB~~ are invited from reputed & experienced bidders (meeting PRE QUALIFICATION CRITERIA as mentioned in Annexure-1) through E-Procurement Portal https://eprocurebhel.co.in only, for the subject job by the undersigned on the behalf of BHARAT HEAVY ELECTRICALS LIMITED as per the tender document. Following points relevant to the tender may please be noted and complied with.

**1.0 Salient Features of NIT**

| S No. | ISSUE | DESCRIPTION | |
|---|---|---|---|
| i | **TENDER NUMBER** | BHE/PW/PUR/TLRPT-CPS/2630 | |
| ii | **Broad Scope of job** | PROVIDING CONSTRUCTION POWER SYSTEM INCLUDING DESIGN, PROCUREMENT OF EQUIPMENT, INSTALLATION INCLUDING CIVIL WORKS, ERECTION,TESTING & COMMISSIONING, OPERATION & MAINTENANCE COMPRISING OF 6.6/11kV SUBSTATION, 11 KV POWER DISTRIBUTION MAIN SYSTEM , LINE, AND 11/0.433 KV PACKAGE SUBSTATIONS AND ASSOCIATED ITEMS AS DETAILED IN TECHNICAL SPECIFICATION FOR 2X660MW NTPC TALCHER PROJECT, ORISSA | |
| iii | **DETAILS OF TENDER DOCUMENT** | | |
| A | Volume-IA | *Technical Conditions of Contract (TCC) consisting of Scope of work, Technical Specification, Drawings, Procedures, Bill of Quantities, Terms of payment, etc.* | *Applicable* |
| B | Volume-IB | *Special Conditions of Contract (SCC)* | *Applicable* |
| C | Volume-IC | *General Conditions of Contract (GCC)* | *Applicable* |
| D | Volume-ID | *Forms and Procedures* | *Applicable* |
| E | Volume-IE | *Technical Specification* | *Applicable* |
| F | Volume-II | *Price Schedule (Absolute value).* | *Applicable* |
| iv | **Issue of Tender Documents** | **Tender documents will be available for downloading from BHEL website (www.bhel.com) or e-procurement portal (https://eprocurebhel.co.in) as per schedule below:**<br>***Start: 24/08/2022, Time :17:30 Hrs***<br>***Closes: 07/09/2022, Time : 13:00 Hrs*** | *Applicable* |

| S No. | ISSUE | DESCRIPTION | |
|---|---|---|---|
| | | Brief information of the tenders shall also be available at central public procurement portal. (*https://eprocure.gov.in/epublish/app*) | |
| **v** | **DUE DATE & TIME OF OFFER SUBMISSION** | ***Date: 07/09/2022, Time :13:00 Hrs***<br>The bidder should submit their offer online only in e-Procurement portal at https://eprocurebhel.co.in<br>***Bidders are requested to upload their offer well in advance in order to avoid last minute congestion at this website.***<br>Hard copy bid or bids through E-mail / fax shall not be accepted. | *Applicable* |
| **vi** | **OPENING OF TENDER (Techno-Commercial Bid)** | ***Date: 07/09/2022, Time: 17:00 Hrs***<br>*Notes:*<br>*(1) In case the due date of opening of tender becomes a non-working day, then the due date & time of offer submission and opening of tenders get extended to the next working day.*<br>*(2) Bidder may depute representative to witness the opening of tender. For e-Tender, Bidder may witness the opening of tender through e-Procurement portal only.* | *Applicable* |
| **vii** | **EMD AMOUNT** | ***₹15,60,000/- (Rs. Fifteen Lakh Sixty Thousand Only)***<br>***Important Note: Bidders kindly to take note that EMD (Earnest Money Deposit) shall be furnished by MSE bidders as well, as per the amount and procedure indicated in the NIT/GCC.*** | *Applicable* |
| **viii** | **COST OF TENDER** | *NIL* | *Not Applicable* |
| **ix** | **LAST DATE FOR SEEKING CLARIFICATION** | **One day before due date of offer submission.**<br>Along with soft version also, addressing to undersigned & to others as per contact address given below:<br>1) Name: Viveka Nand Jha<br>Designation: Manager<br>Deptt: Purchase<br>Address: Floor no. 5 & 6,Shree Mohini Complex, 345 Kingsway, Nagpur-440001<br>Mobile-9429198214<br>Email :**vivekjha@bhel.in**<br>2) Mr. Kamlesh Kumar<br>Designation: DGM<br>Deptt: Purchase<br>Address: Floor no. 5 & 6,Shree Mohini Complex, 345 Kingsway, Nagpur-440001<br>Email: **kamleshbhel@bhel.in** | *Applicable* |

| S No. | ISSUE | DESCRIPTION | |
|---|---|---|---|
| | | Mob: 9425554615<br><br>3) Name: R. M. Malhotra<br>Designation: GM<br>Deptt: Purchase<br>Address: Floor no. 5 & 6, Shree Mohini Complex, 345 Kingsway, Nagpur-440001<br>Email :**rmalhotra@bhel.in** | |
| **x** | **SCHEDULE OF Pre Bid Discussion (PBD)** | ----- | *Not Applicable* |
| **xi** | **INTEGRITY PACT & DETAILS OF INDEPENDENT EXTERNAL MONITOR (IEM)** | *1) Shri Otem Dai, IAS (Retd.)*<br>*2) Shri Bishwamitra Pandey, IRAS (Retd.)*<br>*3) Shri Mukesh Mittal, IRS (Retd.)* | *Not Applicable* |
| **xii** | **Latest updates** | Latest updates on the important dates, Amendments, Correspondences, Corrigenda, Clarifications, Changes, Errata, Modifications, Revisions, etc to Tender Specifications will be hosted in BHEL webpage (www.bhel.com-->Tender Notifications →View Corrigendum), Central Public Procurement portal (https://eprocure.gov.in/epublish/app ) & on e-tender portal https://eprocurebhel.co.in **and not in the newspapers**. Bidders to keep themselves updated with all such information. | |

2.0 The offer shall be submitted as per the instructions of tender document and as detailed in this NIT. Bidders to note specifically that all pages of tender document, including these NIT pages of this particular tender together with subsequent correspondences shall be submitted by them, duly signed digitally using Class III DSC & uploaded in E-Procurement Portal, as part of offer. **Rates/Price including discounts/rebates, if any, mentioned anywhere/in any form in the techno-commercial offer other than the Price Bid, shall not be entertained.**

3.0 Not Used

4.0 Unless specifically stated otherwise, bidder shall deposit EMD as per clause 1.9 of General Conditions of Contract.

For Electronic Fund Transfer the details are as below-:

| | |
|---|---|
| NAME OF THE BENEFICIARY | BHARAT HEAVY ELECTRICALS LTD |
| ADDRESS OF THE COMPANY | 5th Floor, SHREE MOHINI COMPLEX 345, KINGSWAY,NAGPUR |
| NAME OF BANK | STATE BANK OF INDIA |
| NAME OF BANK BRANCH AND BRANCH CODE | SBI,NAGPUR MAIN BRANCH ,CODE-00432 |
| CITY | NAGPUR |
| ACCOUNT NUMBER | 40227423158 |
| ACCOUNT TYPE | MC-C C Clean (C&I) |
| IFSC CODE OF THE BENEFICIARY BANK BRANCH | SBIN0000432 |
| MICR CODE OF THE BANK BRANCH | 440002002 |

(Note -: In case of E-Tenders, proof of remittance of EMD should be uploaded in the E-Procurement Portal and originals, as applicable, shall be sent to the officer inviting tender within a reasonable time, failing which the offer is liable to be rejected.

(Note -: In case of E-Tenders, proof of remittance of EMD should be uploaded in the E-Procurement Portal and originals, as applicable, shall be sent to the officer inviting tender within a reasonable time, failing which the offer is liable to be rejected.

5.0 **Procedure for Submission of Tenders**:

This is an E-tender floated online through our E-Procurement Site **(**https://eprocurebhel.co.in**)**. The bidder should respond by submitting their offer online only in our e-Procurement platform at **(**https://eprocurebhel.co.in**).** Offers are invited in two-parts only.

**Documents Comprising the e-Tender**
The tender shall be submitted online ONLY EXCEPT EMD (in physical form) as mentioned below:

**a. Technical Tender (UN priced Tender)**
All Technical details (e.g. Eligibility Criteria requested (as mentioned below)) should be attached in e-tendering module, failing which the tender stands invalid & may be REJECTED. Bidders shall furnish the following information along with technical tender (preferably in pdf format):

**i.** Earnest Money Deposit (EMD) furnished in accordance with NIT Clause 4.0. ~~Alternatively, documentary evidence for claiming exemption as per clause 29 of NIT~~.
**ii.** Technical Bid (without indicating any prices).

**b. Price Bid:**

i. Prices are to be quoted in the attached Price Bid format online on e-tender portal.
ii. The price should be quoted for the accounting unit indicated in the e-tender document.
iii. Note: It is the responsibility of tenderer to go through the Tender document to ensure furnishing all required documents in addition to above, if any. Any deviation
iv. would result in REJECTION of tender and would not be considered at a later stage at any cost by BHEL.
v. A person signing (manually or digitally) the tender form or any documents forming part of the contract on behalf of another shall be deemed to warrantee that he has authority to bind such other persons and if, on enquiry, it appears that the persons so signing had no authority to do so, the purchaser may, without prejudice to other civil and criminal remedies, cancel the contract and hold the signatory liable for all cost and damages.
vi. A tender, which does not fulfil any of the above requirements and/or gives evasive information/reply against any such requirement, shall be liable to be ignored and rejected.

**DO NOT'S**
Bidders are requested NOT to submit the hard copy of the Bid. In case offer is sent through hard copy/fax/telex/cable/electronically in place of e-tender, the same shall not be considered. **Also, uploading of the price bid in prequalification bid or technical bid may RESULT IN REJECTION of the tender**.

**Digital Signing of e-Tender**
Tenders shall be uploaded with all relevant PDF/zip format. The relevant tender documents should be uploaded by an authorized person having Class 3- SHA2- 2048 BIT- SIGNING & ENCRYPTION digital signature certificate (DSC).

**The Requirement:**
1. A PC with Internet connectivity &
2. DSC (Digital Signature Certificate) (**Class 3- SHA2- 2048 BIT- SIGNING & ENCRYPTION**)

BHEL has finalized the e-procurement service Provider-:

**BHEL has finalized the e-procurement service Provider-:**
NIC PORTAL (https://eprocurebhel.co.in)

For E-PROCUREMENT ASSISTANCE & TRAINING, NIC PORTAL HELPDESK CONTACTS AS PER FOLLOWING:

For any technical related queries, please call at 24 x 7 Help Desk Number
0120-4001 002
0120-4200 462
0120-4001 005
0120-6277 787
1. Peter Raj, NIC, Ph: 9942069052
Email Support: support-eproc@nic.in

The process of utilizing e-procurement necessitates usage of **DSC (Digital Signature Certificate) (Class 3- SHA2- 2048 BIT- SIGNING & ENCRYPTION)** and you are requested to procure the same immediately, if not presently available with you. Please note that only with DSC, you will be able to login the e-procurement secured site and take part in the tendering process.

Please refer http://www.mca.gov.in/ →MCA SERVICES → DSC SERVICES for DSC certifying authorities.

Vendors are also requested to go through bidder manual available on https://eprocurebhel.co.in.

~~**Procedure for Submission of Tenders (To be used in case of Paper bid only):** The Tenderers must submit their Tenders to Officer inviting Tender, as detailed below:~~

- ~~PART-I consisting of 'PART-I A (Techno Commercial Bid)' & 'PART-I B (EMD)' in two separate sealed and superscribed envelopes (ENVELOPE-I & ENVELOPE-II)~~
- ~~PART-II (Price Bid) – in sealed and superscribed envelope (ENVELOPE-III)~~
- ~~One set of tender documents shall be retained by the bidder for their reference~~

6.0 ~~The contents for ENVELOPES and the superscription for each sealed cover/Envelope are as given below.~~ ~~**(All pages to be signed and stamped) (To be used in case of Paper bid only):**~~

| ~~Sl. no.~~ | ~~Description~~ | ~~Remarks~~ |
|---|---|---|
| | ~~**Part I A**~~ | |
| | ~~**ENVELOPE – I superscribed as**:~~<br>~~PART I (TECHNO COMMERCIAL BID)~~<br>~~TENDER NO :~~<br>~~NAME OF WORK :~~<br>~~PROJECT:~~<br>~~DUE DATE OF SUBMISSION:~~<br><br>~~**CONTAINING THE FOLLOWING**:~~ | |
| ~~i.~~ | ~~Covering letter/Offer forwarding letter of Tenderer.~~ | |
| ~~ii.~~ | ~~Duly filled-in `No Deviation Certificate' as per prescribed format to be placed after document under sl no (i) above.~~<br><br>~~**Note:**~~<br>~~a. In case of any deviation, the same should be submitted separately for technical & commercial parts, indicating respective clauses of tender against which deviation is taken by bidder. The list of such deviation shall be placed after document under sl no (i) above. It shall be specifically noted that deviation recorded elsewhere shall not be entertained.~~ | |

| | | |
|---|---|---|
| | b. BHEL reserves the right to accept/reject the deviations without assigning any reasons, and BHEL decision is final and binding.<br>i). In case of acceptance of the deviations, appropriate loading shall be done by BHEL<br>ii). In case of unacceptable deviations, BHEL reserves the right to reject the tender | |
| iii. | Supporting documents/ annexure/ schedules/ drawing etc. as required in line with Pre-Qualification criteria.<br><br>It shall be specifically noted that all documents as per above shall be indexed properly and credential certificates issued by clients shall distinctly bear the name of organization, contact ph. no, FAX no, etc. | |
| iv. | All Amendments/Correspondences/Corrigenda/Clarifications/Changes/ Errata etc. pertinent to this NIT. | |
| v. | Integrity Pact Agreement (Duly signed by the authorized signatory) | If applicable |
| vi. | Duly filled in annexures, formats etc. as required under this Tender Specification/NIT | |
| vii. | Notice inviting Tender (NIT) | |
| viii. | Volume – I A : Technical Conditions of Contract (TCC) consisting of Scope of work, Technical Specification, Drawings, Procedures, Bill of Quantities, Terms of payment, etc. | |
| ix. | Volume – I B : Special Conditions of Contract (SCC) | |
| x. | Volume – I C : General Conditions of Contract (GCC) | |
| xi. | Volume – I D : Forms & Procedures | |
| xii. | Volume – II (UNPRICED – without disclosing rates/price, but mentioning only 'QUOTED' or 'UNQUOTED' against each item | |
| xiii. | Any other details preferred by bidder with proper indexing. | |

| | | |
|---|---|---|
| | **PART I B** | |
| | **ENVELOPE – II superscribed as**:<br>PART I (EMD)<br>TENDER NO :<br>NAME OF WORK :<br>PROJECT:<br>DUE DATE OF SUBMISSION:<br><br>**CONTAINING THE FOLLOWING**: | |
| | Earnest Money Deposit (EMD) in the form as indicated in this Tender | |

| | | |
|---|---|---|
| | **PART II** | |
| | **PRICE BID** consisting of the following shall be enclosed | |
| | **ENVELOPE III**<br>superscribed as:<br>PART II (PRICE BID)<br>TENDER NO :<br>NAME OF WORK :<br>PROJECT:<br>DUE DATE OF SUBMISSION:<br><br>**CONTAINING THE FOLLOWING** | |
| i | Covering letter/Offer forwarding letter of Tenderer enclosed in Part I | |
| ii | Volume II – PRICE BID ( Duly Filled in Schedule of Rates – rate/price to be entered in words as well as figures) | |

| | | |
|---|---|---|
| | **OUTER COVER** | |

| | | |
|---|---|---|
| | ~~**ENVELOPE IV** (MAIN ENVELOPE / OUTER ENVELOPE)~~<br>~~superscribed as:~~<br>~~TECHNO-COMMERCIAL BID, PRICE BID & EMD~~<br>~~TENDER NO:~~<br>~~NAME OF WORK:~~<br>~~PROJECT:~~<br>~~DUE DATE OF SUBMISSION:~~<br><br>~~**CONTAINING THE FOLLOWING:**~~ | |
| ~~i~~ | ~~o Envelopes I~~<br>~~o Envelopes II~~<br>~~o Envelopes III~~ | |

- **SPECIAL NOTE: All documents/ annexures to be submitted should be uploaded in respective places in the E-Tender portal as per the list mentioned given in this NIT. BHEL shall not be responsible for any in-complete documents.**

7.0 Deviation with respect to tender clauses and additional clauses/suggestions in Techno-commercial bid / Price bid shall NOT be considered by BHEL. Bidders are requested to positively comply with the same.

8.0 BHEL reserves the right to accept or reject any or all Offers without assigning any reasons thereof. BHEL also reserves the right to cancel the Tender wholly or partly without assigning any reason thereof. Also BHEL shall not entertain any correspondence from bidders in this matter (except for the refund of EMD).

9.0 **Assessment of Capacity of Bidders**:

**A. Bidder's capacity for executing the job under tender shall be assessed 'LOAD' wise and 'PERFORMANCE' wise as per the following:**

I. **LOAD**: Load takes into consideration **ALL** the contracts of the Bidder under execution with BHEL Regions, irrespective of whether they are similar to the tendered scope or not. The cut off month for reckoning 'Load' shall be the 3rd Month preceding the month corresponding to the 'latest date of bid submission', in the following manner -
(**Note:** For example, if latest bid submission is in Jan 2017, then the 'load' shall be calculated up to and inclusive of Oct 2016)

Total number of Packages in hand = Load (P)

Where 'P' is the sum of all unit wise identified packages (refer table-1) under execution with BHEL Regions as on the cut off month defined above, including packages yet to be commenced, excepting packages which are on Long Hold.

II. **PERFORMANCE**: Here 'Monthly Performance' of the bidder for all the packages (under execution/ executed during the 'Period of Assessment' in all Power Sector Regions of BHEL) **SIMILAR** to the packages covered under the tendered scope, excepting packages not commenced shall be taken into consideration. The 'Period of Assessment' shall be 6 months preceding and including the cut off month. The cut off month for reckoning 'Period of Assessment' shall be the 3rd Month preceding the month corresponding to 'latest date of bid submission', in the following manner:

(**Note**: For example, if 'latest date of bid submission' is in Jan 2017, then the 'performance' shall be assessed for a 6 months' period up to and inclusive of Oct 2016 (i.e. from May 2016 to Oct 2016), for all the unit wise identified packages (refer Table I))

i). Calculation of Overall 'Performance Rating' for 'Similar Package/Packages' for the tendered scope under execution at Power Sector Regions for the 'Period of Assessment':

This shall be obtained by summing up the 'Monthly Performance Evaluation' scores obtained by the bidder in all Regions for all the similar Package/packages', divided by the total number of Package months for which evaluation should have been done, as per procedure below:

a) $P_1$, $P_2$, $P_3$, $P_4$, $P_5$ , …. $P_N$ etc. be the packages (under execution/ executed during the 'Period of Assessment' in all Regions of BHEL) **SIMILAR** to the packages covered under the tendered scope, excepting packages not commenced. Total number of similar packages for all Regions = $\mathbf{P_T}$ (i.e. $P_T = P_1 + P_2 + P_3 + P_4 + \ldots P_N$)

b) Number of Months '$T_1$' for which 'Monthly Performance Evaluation' as per relevant formats, should have been done in the 'Period of Assessment' for the corresponding similar package $P_1$. Similarly $T_2$ for package $P_2$,$T_3$ for package $P_3$, etc. for the tendered scope. Now calculate cumulative total months '$\mathbf{T_T}$' for total similar Packages '$\mathbf{P_T}$' for all Regions (i.e. $\mathbf{T_T} = T_1 + T_2 + T_3 + T_4 + \ldots T_N$ )

c) Sum '$\mathbf{S_1}$ 'of 'Monthly Performance Evaluation' Scores ($S_{1\text{-}1}$, $S_{1\text{-}2}$, $S_{1\text{-}3}$, $S_{1\text{-}4}$, $S_{1\text{-}5}$…. $S_{1\text{-}T1}$) for similar package $P_1$, for the 'period of assessment' '$T_1$' (i.e. $\mathbf{S_1} = S_{1\text{-}1} + S_{1\text{-}2} + S_{1\text{-}3} + S_{1\text{-}4} + S_{1\text{-}5} + \ldots S_{1\text{-}T1}$). Similarly, $\mathbf{S_2}$ for package $P_2$ for period $T_2$, $\mathbf{S_3}$ for package $P_3$ for period $T_3$ etc. for the tendered scope for all Regions. Now calculate cumulative sum '$S_T$' of 'Monthly Performance Evaluation' Scores for total similar Packages '$\mathbf{P_T}$' for all Regions (i.e. '$S_T$'$= S_1 + S_2 + S_3 + S_4 + S_5 + \ldots S_N$.)

d) **Overall Performance Rating '$R_{BHEL}$' for the Similar Package/Packages** (under execution/ executed during the 'Period of Assessment') in all the Power Sector Regions of BHEL

$$= \frac{\text{Aggregate of Performance scores for all similar packages in all the Regions}}{\text{Aggregate of months for each of the similar packages for which performance should have been evaluated in all the Regions}}$$

$$= \frac{S_T}{T_T}$$

**e) Bidders to note that the risk of non-evaluation or non-availability of the 'Monthly Performance Evaluation' reports as per relevant formats is to be borne by the Bidder.**

**f) Table showing methodology for calculating 'a', 'b' and 'c' above**

| Sl. No. | Item Description | Details for all Regions | | | | | | | Total |
|---|---|---|---|---|---|---|---|---|---|
| (i) | (ii) | (iii) | (iv) | (v) | (vi) | (vii) | (viii) | (ix) | (x) |
| 1 | Similar Packages for all Regions → (under execution/ executed during period of assessment) | $P_1$ | $P_2$ | $P_3$ | $P_4$ | $P_5$ | … | $P_N$ | Total No. of similar packages for all Regions = $\mathbf{P_T}$ i.e. Sum (Σ) of columns (iii) to (ix) |
| 2 | Number of Months for which 'Monthly Performance Evaluation' as per relevant formats should have been done in the 'period of assessment' for corresponding Similar Packages ( as in row 1) | $T_1$ | $T_2$ | $T_3$ | $T_4$ | $T_5$ | … | $T_N$ | Sum (Σ) of columns (iii) to (ix) = $\mathbf{T_T}$ |
| 3 | Monthly performance scores for the corresponding period (as in Row 2) | $S_{1\text{-}1}$, $S_{1\text{-}2}$, $S_{1\text{-}3}$, $S_{1\text{-}4}$, … $S_{1\text{-}T1}$ | $S_{2\text{-}1}$, $S_{2\text{-}2}$, $S_{2\text{-}3}$, $S_{2\text{-}4}$, … $S_{2\text{-}T2}$ | $S_{3\text{-}1}$, $S_{3\text{-}2}$, $S_{3\text{-}3}$, $S_{3\text{-}4}$, … $S_{3\text{-}T3}$ | $S_{4\text{-}1}$, $S_{4\text{-}2}$, $S_{4\text{-}3}$, $S_{4\text{-}4}$, … $S_{4\text{-}T4}$ | $S_{5\text{-}1}$, $S_{5\text{-}2}$, $S_{5\text{-}3}$, $S_{5\text{-}4}$, … $S_{5\text{-}T5}$ | .. … … … … | $S_{N\text{-}1}$, $S_{N\text{-}2}$, $S_{N\text{-}3}$, $S_{N\text{-}4}$, … $S_{N\text{-}TN}$ | -------- |
| 4 | Sum of Monthly Performance scores of the corresponding Package for the corresponding period (as in row-3) | $S_1$ | $S_2$ | $S_3$ | $S_4$ | $S_5$ | … | $S_N$ | Sum (Σ) of columns (iii) to (ix) = $\mathbf{S_T}$ |

ii). Calculation of Overall 'Performance Rating' ($\mathbf{R_{BHEL}}$) in case at least 6 evaluation scores for 'similar Package/Packages' for the tendered scope ARE NOT AVAILABLE, during the 'Period of Assessment':

This shall be obtained by summing up the 'Monthly Performance Evaluation' scores obtained by the bidder in all Regions for ALL the packages, divided by the total number of Package months for which evaluation should have been done. '$R_{BHEL}$' shall be calculated subject to availability of 'performance scores' for at least 6 'package months' in the order of precedence below:

a) 'Period of Assessment' i.e. 6 months preceding and including the cut-off month
b) 12 months preceding and including the cut-off month
c) 24 months preceding and including the cut-off month

In case, $R_{BHEL}$ cannot be calculated as above, then Bidder shall be treated as 'NEW VENDOR'. Further eligibility and qualification of this bidder shall be as per definition of 'NEW VENDOR' described in 'Explanatory Notes'.

iii). Factor "L" assigned based on Overall Performance Rating ($R_{BHEL}$) at Power Sector Regions:

| Sl. no. | Overall Performance Rating ($R_{BHEL}$) | Corresponding value of 'L' |
|---|---|---|
| 1 | =60 | NA |
| 2 | > 60 and ≤ 65 | 0.4 |
| 3 | > 65 and ≤ 70 | 0.35 |
| 4 | > 70 and ≤ 75 | 0.25 |
| 5 | > 75 and < 80 | 0.2 |
| 6 | ≥ 80 | NA |

iv). Performance Systems: The performance rating as mentioned in II (i) and (ii) above, shall be calculated as per Online Systems i.e. Contractor Performance Evaluation System (CPES) and Safety Performance Evaluation System (HSEPES). The scores assigned in HSEPES shall be scaled down to 10 and assigned in CPES against the category "HSE" (mentioned in Form F-15).

**III. 'Assessment of Capacity of Bidder':**

'Assessment of Capacity of Bidder' is based on the Maximum number of packages for which a vendor is eligible, considering the performance scores of similar packages, as below:

Max number of packages $P_{Max}$= ($R_{BHEL}$ - 60) divided by corresponding value of 'L', i.e. ($R_{BHEL}$- 60)/L

Note:

i). In case the value of $P_{Max}$ results in a fraction, the value of $P_{Max}$ is to be rounded off to next whole number

ii). For $R_{BHEL}$ = 60, $P_{Max}$ = '1'

iii). For $R_{BHEL}$ ≥ 80, there will be no upper limit on $P_{Max}$

The Bidder shall be considered 'Qualified' as per 'Assessment of Capacity of Bidder' for the subject Tender if P ≤ $P_{Max}$

(Where P is calculated as per clause 'I' above)

In addition to above, in case contractor fails to score more than 5 (five) marks in the scaled down scores of HSEPES for "more than 2 months in a period of 6 months preceding and including the cut-off month in any single package", the contractor shall be considered disqualified for ongoing tender(s) of BHEL. Qualification of bidder for further tendering process shall be subject to qualifying this condition in addition to qualifying requirements mentioned in PQR. Bidders who did not qualify this condition shall not be considered under the provisions of clause 9 IV (iv) of NIT.

IV. **Explanatory note**:

i). Similar package means Boiler or ESP or Piping or Turbine or Civil or Structure or Electrical or C&I etc. at the individual level irrespective of rating of Plant and irrespective of whether the subject tender is a single package or as part of combined/composite packages. Normally Boiler, ESP, Piping, Turbine, Electrical, C&I, Civil, Structure etc. is considered individual level of package. For example, in case the tendered scope is a Boiler Vertical Package comprising of Boiler, ESP and Power Cycle Piping (i.e. the 'identified packages as per Table-1 below), the 'PERFORMANCE' part against sl.no. II above, needs to be evaluated considering all the identified packages (i.e. Boiler, ESP and Power Cycle Piping) and finally the Bidder's capacity to execute the tendered scope is assessed in line with III above.

ii). Identified Packages (Unit wise)

**Table-1**

| Civil | Electrical and C&I | Mechanical |
|---|---|---|
| i). Enabling works<br>ii). Pile and Pile Caps<br>iii). Civil Works including foundations<br>iv). Structural Steel Fabrication & Erection<br>v). Chimney<br>vi). Cooling Tower<br>vii). Others (Civil) | i). Electrical<br>ii). C&I<br>iii). Others (Elect. and C&I) | i). Boiler & Aux (All types including CW Piping if applicable)<br>ii). Power Cycle Piping/Critical Piping<br>iii). ESP<br>iv). LP Piping<br>v). Steam Turbine Generator set & Aux<br>vi). Gas Turbine Generator set & Aux<br>vii). Hydro Turbine Generator set & Aux<br>viii). Turbo Blower (including Steam Turbine)<br>ix). Material Management<br>x). FGD<br>xi). ACC<br>xii). Others (Mechanical) |

iii). Bidders who have not been evaluated for at least six package months in the last 24 months preceding and including the Cut-off month in the online BHEL system for contractor performance evaluation in BHEL PS Regions, shall be considered "NEW VENDOR".

A 'NEW VENDOR' shall be considered qualified subject to satisfying all other tender conditions.

A 'NEW VENDOR' if awarded a job (of package/packages identified under this clause) shall be tagged as "FIRST TIMER" on the date of first LOI from BHEL.

The "FIRST TIMER" tag shall remain till completion of all the contracts against which vendor has been tagged as First Timer or availability of 6 evaluation scores within last 24 months preceding and including the Cut-off month in the online BHEL system for contractor performance evaluation in BHEL PS Regions.

A Bidder shall not be eligible for the next job as long as the Bidder is tagged as "FIRST TIMER" excepting for the Tenders which have been opened on or before the date of the bidder being tagged as 'FIRST TIMER'.

After removal of 'FIRST TIMER' tag, the Bidder shall be considered 'QUALIFIED' for the future tenders subject to satisfying all other tender conditions including 'Assessment of Capacity of Bidders'.

iv). Consequent upon applying the criteria of 'Assessment of Capacity of Bidders' detailed above on all the bidders qualified against Technical and Financial Qualification criteria, if the number of qualified bidders reduces to less than four, then for further processing of the Tender, BHEL at its discretion reserves the right to also consider the bidders who are "not qualified" as per criteria of 'Assessment of Capacity of Bidders' and for this, procedure described in following three options shall be followed:

a) All the bidders having Overall Performance Rating ('$R_{BHEL}$') ≥60 shall be considered qualified against criteria of 'Assessment of Capacity of Bidders'.
b) If even after using option "a", the number of qualified bidders remains less than four, then in addition to bidders considered as per option "a", "First timer" bidders having average of available

performance scores ≥60 upto and including the Cut Off month shall also be considered qualified against criteria of 'Assessment of Capacity of Bidders'.

c) If even after using option "a" and "b", the number of qualified bidders remains less than four, then in addition to bidders considered as per option "a" and "b", "First timer" bidders for whom no performance score is available in the system upto and including the Cut Off month, shall also be considered qualified against criteria of 'Assessment of Capacity of Bidders'.

**Note:-** In case, the number of bidders qualified against Technical and Financial Qualification criteria itself is less than four, then all bidders (a)- having Overall Performance Rating ('$R_{BHEL}$') ≥60, (b)- First timer" bidders having average of available performance scores ≥60 upto and including the Cut Off month, (c)- "First timer" bidders for whom no performance score is available in the system upto and including the Cut Off month, shall be considered qualified against criteria of 'Assessment of Capacity of Bidders' for further processing of tender.

v). 'Under execution' shall mean works in progress as per the following:

a. Up to execution of 90% of anticipated Contract Value in case of Civil, MM, Structural and Turbo Blower Packages

b. Up to Steam Blowing in case of Boiler/ESP/Piping Packages

c. Up to Synchronization in all Balance Packages

Note: BHEL at its discretion can extend (or reduce in exceptional cases in line with Contract conditions) the period defined against (a), (b) and (c) above, depending upon the balance scope of work to be completed.

vi). Contractor shall provide the latest contact details i.e. mail-ID and Correspondence Address to SCT Department, so that same can be entered in the Contractor Performance Evaluation System, and in case of any change/discrepancy same shall be informed immediately. Login Details for viewing scores in Contractor Performance Evaluation System shall be provided to the Contractor by SCT Department.

vii). Performance Evaluation for Activity Month shall be completed in Evaluation Month (i.e. month next to Activity Month) or in rare cases in Post Evaluation Month (i.e. month next to Evaluation Month) after approval from Competent Authority. In case scores are not acceptable, Contractor can submit Review Request to GM Site/ GM Project latest by 27$^{th}$ of Evaluation Month or 5 days after approval of score, whichever is later. However, acceptance/rejection of 'Review Request' solely depends on the discretion of GM Site/GM Project. After acceptance of Review Request, evaluation score shall be reviewed at site and the score after completion of review process shall be acceptable and binding on the contractor.

viii). Project on Hold due to reasons not attributable to bidder -

a. **Short hold:** Evaluation shall not be applicable for this period, however, Loading will be considered.

b. **Long hold:** Short hold for continuous six months and beyond or hold on account of Force Majeure shall be considered as Long Hold. Evaluation as well as Loading shall not be considered for this period.

ix). Performance evaluation as specified above in this clause is applicable to Prime bidder and Consortium partner (or Technical tie up partner) for their respective scope of work.

10.0 Since the job shall be executed at site, bidders must visit site/ work area and study the job content, facilities available, availability of materials, prevailing site conditions including law & order situation, applicable wage

structure, wage rules, etc. before quoting for this tender. They may also consult this office before submitting their offers, for any clarifications regarding scope of work, facilities available at sites or on terms and conditions.

11.0 For any clarification on the tender document, the bidder may seek the same in writing or through e-mail and/or through e-procurement portal **https://eprocurebhel.co.in**, as per specified format, within the scheduled date for seeking clarification, from the office of the undersigned. BHEL shall not be responsible for receipt of queries after due date of seeking clarification due to postal delay or any other delays. Any clarification / query received after last date for seeking clarification may not be normally entertained by BHEL and no time extension will be given.

12.0 BHEL may decide holding of pre-bid discussion [PBD] with all intending bidders as per date indicated in the NIT. The bidder shall ensure participation for the same at the appointed time, date and place as may be decided by BHEL. Bidders shall plan their visit accordingly. The outcome of pre-bid discussion (PBD) shall also form part of tender.

13.0 In the event of any conflict between requirement of any clause of this specification/ documents/drawings/data sheets etc. or requirements of different codes/standards specified, the same to be brought to the knowledge of BHEL in writing for clarification before due date of seeking clarification (whichever is applicable), otherwise, interpretation by BHEL shall prevail. Any typing error/missing pages/ other clerical errors in the tender documents, noticed must be pointed out before pre-bid meeting/submission of offer, else BHEL's interpretation shall prevail.

14.0 Unless specifically mentioned otherwise, bidder's quoted price shall deemed to be in compliance with tender including PBD.

15.0 Bidders shall submit Integrity Pact Agreement (Duly signed by authorized signatory who signs in the offer), **if applicable**, along with techno-commercial bid. This pact shall be considered as a preliminary qualification for further participation. **The names and other details of Independent External Monitor (IEM) for the subject tender is as given at point (1) above.**

**"Integrity Pact (IP)"**

(a) IP is a tool to ensure that activities and transactions between the Company and its Bidders/ Contractors are handled in a fair, transparent and corruption free manner. Following Independent External Monitors (IEMs) on the present panel have been appointed by BHEL with the approval of CVC to oversee implementation of IP in BHEL.

| Sl. No. | IEM | Email |
|---|---|---|
| 1. | *Shri Otem Dai, IAS (Retd.)* | iem1@bhel.in |
| 2. | *Shri Bishwamitra Pandey, IRAS (Retd.)* | Iem2@bhel.in |
| 3. | *Shri Mukesh Mittal, IRS (Retd.)* | Iem3@bhel.in |

(b) The IP as enclosed with the tender is to be submitted (duly signed by authorized signatory) along with techno-commercial bid (Part-I, in case of two/ three part bid). Only those bidders who have entered into such an IP with BHEL would be competent to participate in the bidding. In other words, entering into this Pact would be a preliminary qualification.

(c) Please refer Section-8 of IP for Role and Responsibilities of IEMs. In case of any complaint arising out of the tendering process, the matter may be referred to any of the above IEM(s). All correspondence with the IEMs shall be done through email only.

*Note:*

*No routine correspondence shall be addressed to the IEM (phone/ post/ email) regarding the clarifications, time extensions or any other administrative queries, etc. on the tender issued. All such clarification/ issues shall be addressed directly to the tender issuing (procurement) department's officials whose contact details are provided below:*

Details of contact person(s):

| | | |
|---|---|---|
| **Name**: | R M Malhotra/ GM (Purchase) | Deepak Kumar/Manager (Purchase) |
| **Dept:** | Purchase Department | |
| **Address:** | Floor No. 5 & 6, Shreemohini Complex, 345 Kingsway, Nagpur-440001 | |
| **Email:** | rmalhotra@bhel.in | kumar_deepak@bhel.in |
| **Phone:** | 0712-2858633 | 8004939836 |

16.0 The Bidder has to satisfy the Pre-Qualifying Requirements stipulated for this Tender in order to be qualified. The Price Bids of only those bidders will be opened who will be qualified for the subject job on the basis of satisfying the Pre-Qualification Criteria specified in this NIT as per Annexure-I (as applicable), past performance etc. and date of opening of price bids shall be intimated to only such bidders. BHEL reserves the right not to consider offers of parties under HOLD.

**17.0** In case BHEL decides on a `Public Opening', the date & time of opening of the sealed PRICE BID shall be intimated to the qualified bidders and in such a case, bidder may depute one authorized representative to witness the price bid opening. BHEL reserves the right to open 'in-camera' the 'PRICE BID' of any or all Unsuccessful/Disqualified bidders under intimation to the respective bidders.

18.0 Validity of the offer shall be for **six months** from the latest due date of offer submission (including extension, if any) unless specified otherwise.

19.0 **Reverse Auction:** "BHEL shall be resorting to Reverse Auction (RA) (Guidelines as available on www.bhel.com) (https://www.bhel.com/guidelines-reverse-auction-2021) for this tender. RA shall be conducted among the techno-commercially qualified bidders.

Price bids of all techno-commercially qualified bidders shall be opened and same shall be considered for RA. In case any bidder(s) do(es) not participate in online Reverse Auction, their sealed envelope price bid along with applicable loading, if any, shall be considered for ranking."

**Note:-**

**1.** No benefits to MSE bidders w.r.t Reverse Auction Guidelines as available on www.bhel.com against works contract.

**2**. In case of enquiry through e-procurement the sealed electronic price bid (e-bid) is to be treated as sealed envelope price bid.

20.0 On submission of offer, further consideration will be subject to compliance to tender & qualifying requirement and customer's acceptance, as applicable.

21.0 In case the bidder is an "Indian Agent of Foreign Principals", 'Agency agreement has to be submitted along with Bid, detailing the role of the agent along with the terms of payment for agency commission in INR, along with supporting documents.

22.0 The bidders shall not enter into any undisclosed M.O.U. or any understanding amongst themselves with respect to tender.

23.0 ~~Consortium Bidding (or Technical Tie up) shall be allowed only if specified in Pre-Qualifying Requirement (PQR) criteria, and in such a case the following shall be complied with:~~

~~23.1 Prime Bidder and Consortium Partner or partners are required to enter into a consortium agreement for the said contract with a validity period of six months initially. In case bidder becomes L1, Consortium Agreement valid till contractual completion period shall be submitted to BHEL before signing the contract. Consortium Agreement shall be kept valid till scope of work awarded to consortium partner(s) as per contract is completed.~~

~~23.2 'Standalone' bidder cannot become a '**Prime Bidder' or a 'Consortium bidder' or 'Technical Tie up bidder' in a consortium (or Technical Tie up) bidding**. Prime bidder shall neither be a consortium partner to other prime bidder nor take any other consortium partners. However, consortium partner may enter into consortium agreement with other prime bidders. In case of non-compliance, consortium bids of such Prime bidders will be rejected.~~

~~23.3 Number of partners for a Consortium Bidding (or Technical Tie up) including Prime Bidder shall be NOT more than 3 (three).~~

~~23.4 Prime Bidder shall be as specified in the Pre-Qualification Requirement, else the bidder who has the major share of work.~~

~~23.5 In order to be qualified for the tender, Prime Bidder and Consortium partner or partners shall satisfy (i) the Technical 'Pre Qualifying Requirements' specified for the respective package, (ii) "Assessment of Capacity of Bidder' as specified in clause 9.0.~~

~~23.6 Prime Bidder shall comply with additional 'Technical' criteria of PQR as defined in 'Explanatory Notes for the PQR'.~~

~~23.7 Prime Bidder shall comply with all other Pre Qualifying criteria for the Tender unless otherwise specified~~

~~23.8 In case customer approval is required, then Prime Bidder and Consortium Partner or partners shall have to be individually approved by Customer for being considered for the tender.~~

~~23.9 Prime Bidder shall be responsible for the overall execution of the contract.~~

~~23.10 In case of award of job, Performance shall be evaluated for Prime Bidder and Consortium Partner or partners for their respective scope of work(s) as per prescribed formats.~~

~~23.11 In case the Consortium partner or partners back out, their SDs shall be encashed by BHEL and BHEL shall take necessary action as per extant guidelines. In such a case, other consortium partner or partners meeting the PQR have to be engaged by the Prime Bidder, and if not, the respective work will be withdrawn and executed on risk and cost basis of the Prime Bidder. The new consortium partner or partners shall submit fresh SDs as applicable.~~

~~23.12 In case Prime Bidder withdraws or insolvency / liquidation / winding up proceedings have been initiated / admitted against the Prime Bidder, BHEL reserves the right to cancel, terminate or short close the contract or take any other action to safeguard BHEL's interest in the Project / Contract. This action will be without prejudice to any other action that BHEL can take under Law and the Contract to safeguard interests of BHEL.~~

~~23.13 After execution of work, the work experience shall be assigned to the Prime Bidder and the consortium partner or partners for their respective scope of work. After successful execution of one work with a consortium partner under direct order of BHEL, the Prime Bidder shall be eligible for becoming a 'standalone' bidder for works similar to that for which consortium partner was engaged, for subsequent tenders.~~

~~23.14 The consortium partner shall submit SD equivalent to 1% of the total contract value in addition to the SD to be submitted by the Prime Bidder for the total contract value. In case there are two consortium partners, then each partner shall submit SD equivalent to 0.5% of the total contract value in addition to the SD to be submitted by the Prime Bidder for the total contract value. However, Prime Bidder has also option for submission of SD on behalf of consortium partner (s).~~

~~SD submitted by Consortium Partner(s) may be released in case corresponding scope of work of the respective Consortium partner(s) has been completed upto the extent of 80% based on certification by Construction Manager and concurrence by the prime bidder.~~

~~23.15 In case of a Technical Tie up, all the clauses applicable for the Consortium partner shall be applicable for the Technical Tie up partner also.~~

24.0 The bidder shall submit/upload documents in support of possession of 'Qualifying Requirements' duly self-certified and stamped by the authorized signatory, indexed and properly linked in the format for PQR. In case BHEL requires any other documents/proofs, these shall be submitted immediately.

25.0 The bidder may have to produce original document for verification if so decided by BHEL.

26.0 The consultant / firm (and any of its affiliates) shall not be eligible to participate in tender(s) for the related works or services for the same project, if they were engaged for the consultancy services.

27.0 Guidelines/rules in respect of Suspension of Business dealings, Vendor evaluation format, Quality, Safety & HSE guidelines, Experience Certificate, etc. may undergo change from time to time and the latest one shall be followed. The abridged version of extant 'Guidelines for suspension of business dealings with suppliers/ contractors' is available on www.bhel.com on "**supplier registration page**".

28.0 The offers of the bidders who are on the banned/ hold list and also the offer of the bidders, who engage the services of the banned/ hold firms, shall be rejected. The list of **banned/ hold firms** is available on BHEL web site www.bhel.com.

28.1 Integrity commitment, performance of the contract and punitive action thereof:

**28.1.1 Commitment by BHEL:**
BHEL commits to take all measures necessary to prevent corruption in connection with the tender Process and execution of the contract. BHEL will during the tender process treat all Bidder(s) in a transparent and fair manner, and with equity.

**28.1.2 Commitment by Bidder/ Supplier/ Contractor:**

(i) The bidder/ supplier/ contractor commit to take all measures to prevent corruption and will not directly or indirectly influence any decision or benefit which he is not legally entitled to nor will act or omit in any manner which tantamount to an offence punishable under any provision of the Indian Penal Code, 1860 or any other law in force in India.

(ii) The bidder/ supplier/ contractor will, when presenting his bid, disclose any and all payments he has made, and is committed to or intends to make to agents, brokers or any other intermediaries in

connection with the award of the contract and shall adhere to relevant guidelines issued from time to time by Govt. of India/ BHEL.

(iii) The bidder/ supplier/ contractor will perform/ execute the contract as per the contract terms & conditions and will not default without any reasonable cause, which causes loss of business/ money/ reputation, to BHEL.

If any bidder/ supplier/ contractor during pre-tendering/ tendering/ post tendering/ award/ execution/ post-execution stage indulges in mal-practices, cheating, bribery, fraud or and other misconduct or formation of cartel so as to influence the bidding process or influence the prices or acts or omits in any manner which tantamount to an offence punishable under any provision of the Indian Penal Code, 1860 or any other law in force in India, then, action may be taken against such bidder/ supplier/ contractor as per extent guidelines of the company available on www.bhel.com and / or under applicable legal provisions.

**29.0 ~~Micro and Small Enterprises (MSE)~~**

~~Any Bidder falling under MSE category, shall furnish the following details & submit documentary evidence/ Govt. Certificate etc. in support of the same along with their techno-commercial offer.~~

| ~~Type under MSE~~ | ~~SC/ST owned~~ | ~~Women owned~~ | ~~Others (excluding SC/ ST & Women Owned)~~ |
|---|---|---|---|
| ~~Micro~~ | | | |
| ~~Small~~ | | | |

~~**Note: -** If the bidder does not furnish the above, offer shall be processed construing that the bidder is not falling under MSE category.~~

~~*a)* MSE suppliers can avail the intended benefits in respect of the procurements related to the Goods and Services only (Definition of Goods and Services as enumerated by Govt. of India vide Office Memorandum F. No. 21(8)/2011-MA dtd. 09/11/2016 office of AS & DC, MSME) only if they submit along with the offer, attested copies of either Udyam Registration Certificate or EM-II certificate having deemed validity (five years from the date of issue of acknowledgement in EM-II) or valid NSIC certificate or Udyog Aadhar Memorandum (UAM) & Acknowledgement or EM-II Certificate along with attested copy of a CA certificate (format enclosed as Annexure – 3) where deemed validity of EM-II certificate of five years has expired applicable for the relevant financial year (latest audited). Date to be reckoned for determining the deemed validity will be the last date of Technical Bid submission. Non submission of such documents will lead to consideration of their bids at par with other bidders. No benefits shall be applicable for this enquiry if the above required documents are not submitted before price bid opening. If the tender is to be submitted through e-procurement portal, then the above required documents are to be uploaded on the portal. Documents should be notarized or attested by a Gazetted officer. Documents submitted by the bidder may be verified by BHEL for rendering the applicable benefits.~~

30.0 The Bidder along with its associate/ collaborators/ sub-contractors/ sub-vendors/ consultants/ service providers shall strictly adhere to BHEL Fraud Prevention Policy displayed on BHEL website http://www.bhel.com and shall immediately bring to the notice of BHEL Management about any fraud or suspected fraud as soon as it comes to their notice.

31.0 **PREFERENCE TO MAKE IN INDIA:**

For this procurement, the local content to categorize a supplier as a Class I local supplier/ Class II local Supplier/Non-Local Supplier and purchase preferences to Class I local supplier, is as defined I Public Procurement (Preference to Make in India), Order 2017 dated 04.06.2020 issued by DPIIT. In case of subsequent orders issued by the nodal ministry, changing the definition of local content for the items of the NIT, the same shall be applicable even if issued after issue of this NIT, but before opening of Part-II bids against this NIT.

**31.1 Compliance to Restrictions under Rule 144 (xi) of GFR 2017**

I. Any bidder from a country which shares a land border with India will be eligible to bid in this tender only if the bidder is registered with the Competent Authority. The Competent Authority for the purpose of this Clause shall be the Registration Committee constituted by the Department for Promotion of Industry and Internal Trade (DPIIT).

II. "Bidder" (including the term 'tenderer', 'consultant' or 'service provider' in certain contexts) means any person or firm or company, including any member of a consortium or joint venture (that is an association of several persons, or firms or companies), every artificial juridical person not falling in any of the descriptions of bidders stated hereinbefore, including any agency branch or office controlled by such person, participating in a procurement process.

III. "Bidder from a country which shares a land border with India" for the purpose of this Clause means: -
   a. An entity incorporated established or registered in such a country; or
   b. A subsidiary of an entity incorporated established or registered in such a country; or
   c. An entity substantially controlled through entities incorporated, established or registered in such a country; or
   d. An entity whose beneficial owner is situated in such a country; or
   e. An Indian (or other) agent of such an entity; or
   f. A natural person who is a citizen of such a country; or
   g. A consortium or joint venture where any member of the consortium or joint venture falls under any of the above.

IV. The beneficial owner for the purpose of (III) above will be as under:
   1. In case of a company or Limited Liability Partnership, the beneficial owner is the natural person(s), who, whether acting alone or together or through one or more juridical person, has a controlling ownership interest or who exercises control through other means.
      Explanation
      a. "Controlling ownership interest" means ownership of or entitlement to more than twenty-five per cent of shares or capital or profits of the company.
      b. "Control" shall include the right to appoint majority of the directors or to control the management or policy decisions including by virtue of their shareholding or management rights or shareholders agreements or voting agreements.
   2. In case of a partnership firm, the beneficial owner is the natural person(s) who, whether acting alone or together, or through one or more juridical person, has ownership of entitlement to more than fifteen percent of capital or profits of the partnership.
   3. In case of an unincorporated association or body of individuals, the beneficial owner is the natural person(s), who, whether acting alone or together, or through one or more juridical person has ownership of or entitlement to more than fifteen percent of the property or capital or profits of the such association or body of individuals.
   4. Where no natural person is identified under (1) or (2) or (3) above, the beneficial owner is the relevant natural person who holds the position of senior managing official;
   5. In case of a trust, the identification of beneficial owner(s) shall include identification of the author of the trust, the trustee, the beneficiaries with fifteen percent or more interest in the trust and any other natural person exercising ultimate effective control over the trust through a chain of control or ownership.

V. An Agent is a person employed to do any act for another, or to represent another in dealings with third person.

VI. The successful bidder shall not be allowed to sub-contract works to any contractor from a country which shares a land border with India unless such contractor is registered with the Competent Authority.

**Note:**

(i) The bidder shall provide undertaking for their compliance to this Clause, in the Format provided in **Annexure-11.**

(ii) Registration of the bidder with Competent Authority should be valid at the time of submission as well as acceptance of the bids.

32.0 ~~Bid should be free from correction, overwriting, using corrective fluid, etc. Any interlineation, cutting, erasure or overwriting shall be valid only if they are attested under full signature(s) of person(s) signing the bid else bid shall be liable for rejection.~~

~~All overwriting/cutting, etc., will be numbered by bid opening officials and announced during bid opening~~.

33.0 In the course of evaluation, if more than one bidder happens to occupy L-1 status, effective L-1 will be decided by soliciting discounts from the respective L-1 bidders.

In case more than one bidder happens to occupy the L-1 status even after soliciting discounts, the L-1 bidder shall be decided by a toss/ draw of lots, in the presence of the respective L-1 bidder(s) or their representative(s).

Ranking will be done accordingly. BHEL's decision in such situations shall be final and binding.

34.0 The Bidder declares that they will not enter into any illegal or undisclosed agreement or understanding, whether formal or informal with other Bidder(s). This applies in particular to prices, specifications, certifications, subsidiary contracts, submission or non-submission of bids or any other actions to restrict competitiveness or to introduce cartelization in the bidding process.

In case, the Bidder is found having indulged in above activities, suitable action shall be taken by BHEL as per extant policies/ guidelines.

35.0 Order of Precedence:

In the event of any ambiguity or conflict between the Tender Documents, the order of precedence shall be in the order below:

a. Amendments/Clarifications/Corrigenda/Errata etc. issued in respect of the tender documents by BHEL
b. Notice Inviting Tender (NIT)
c. Price Bid
d. Technical Conditions of Contract (TCC)—Volume-1A
e. Special Conditions of Contract (SCC) —Volume-1B
f. General Conditions of Contract (GCC) —Volume-1C
g. Forms and Procedures —Volume-1D

It may please be noted that guidelines/ circulars/ amendments/ govt. directives issued from time to time shall also be applicable.

For BHARAT HEAVY ELECTRICALS LTD

(General Manager - Purchase)

**Enclosure:**

1.0 Annexure-1: Pre Qualifying Requirements.
2.0 Annexure-2: Check List.
~~3.0 Annexure-3: Certificate by Chartered Accountant~~
4.0 Annexure-4: Reverse Auction Process Compliance Form

**ANNEXURE-1**

## PRE QUALIFYING CRITERIA

| **E-Tender Spec No: BHE/PW/PUR/TLRPT-CPS/2630** | |
|---|---|
| **JOB** | **PROVIDING CONSTRUCTION POWER SYSTEM INCLUDING DESIGN, PROCUREMENT OF EQUIPMENT, INSTALLATION INCLUDING CIVIL WORKS, ERECTION,TESTING & COMMISSIONING, OPERATION & MAINTENANCE COMPRISING OF 6.6/11kV SUBSTATION, 11 KV POWER DISTRIBUTION MAIN SYSTEM , LINE, AND 11/0.433 KV PACKAGE SUBSTATIONS AND ASSOCIATED ITEMS AS DETAILED IN TECHNICAL SPECIFICATION FOR 2X660MW NTPC TALCHER PROJECT, ORISSA** |

| **S No** | **PRE QUALIFICATION CRITERIA** | **Bidders claim in respect of fulfilling the PQR Criteria** | |
|---|---|---|---|
| | | **Applicability** | |
| **A** | Submission of Integrity Pact duly signed (if applicable)<br>(Note: To be submitted by Prime Bidder ~~& Consortium /Technical Tie up partner jointly in case Consortium bidding is permitted, otherwise by the sole bidder~~) | Applicable | |
| **B** | **B) Technical PQR**<br>Bidder should have executed the similar works* as below in the last seven (7) years as on latest date of bid submission.<br>**B.1**<br>B.1.1) Executed One similar work* of value not less than Rs. 468 Lakhs against single work order.<br>(OR)<br>B.1.2) Executed Two similar works* each of value not less than Rs. 312 Lakhs against maximum two work orders.<br>(OR)<br>B.1.3) Executed Three similar works* each of value not less than Rs. 234 Lakhs against maximum three work orders.<br>***Similar Works Definition:**<br>1. Executed (Supply, Erection & Commissioning) / (Erection and Commissioning) of Electrical System / Switchyard / Power Transmission System / Power Distribution System / LT Substation etc. consisting of following systems:<br>a. 250kVA or higher capacity Transformer,<br>b. 6.6kV or higher HT Switchgear, and<br>c. Overhead lines or HT/LT Cabling<br>(OR)<br>2. Provided Construction Power supply distribution network on 'Build, Own, Operate' basis or 'Lease basis' consisting of following systems:<br>a. 250kVA or higher capacity transformer,<br>b. 6.6kV or higher HT Switchgear, and<br>c. Overhead Lines or HT/LT Cabling | Applicable | |

| | | | |
|---|---|---|---|
| **C-1** | **Financial TURNOVER**<br><br>Bidders must have achieved an average annual financial turnover (audited) of **₹ 234 Lakhs** or more over last three Financial Years (FY) i.e. " **2018-19, 2019-20 & 2020-21"** | Applicable | |
| **C-2** | **NETWORTH** (only in case of Companies)<br>Net worth of the Bidder based on the latest Audited Accounts as furnished for 'C-1' above should be positive. | Applicable | |
| **C-3** | **PROFIT**<br>Bidder must have earned profit in any one of the three Financial Years as applicable in the last three Financial Years as furnished for 'C-1 above. | Applicable | |
| **C-4** | Bidder must not be under Insolvency Resolution Process or Liquidation or Bankruptcy Code Proceedings (IBC) as on date, by NCLT or any adjudicating authority/authorities, which will render him ineligible for participation in this tender, and shall submit undertaking (Annexure-8) to this effect | Applicable | |
| **D** | **Assessment of Capacity of Bidder to execute the work as per sl no 9 of NIT (if applicable)**<br><br>Applicable, The "Assessment of Capacity of Bidders" for this Tender shall be carried out by considering the identified packages i.e**. "ELECTRICALS".** | Applicable | |
| ~~**E**~~ | ~~**Approval of Customer (if applicable)**~~ | Not Applicable | BY BHEL |
| **F** | Price Bid Opening<br>**Note:** Price Bids of only those bidders shall be opened who stand qualified after compliance of criteria A to E | | BY BHEL |
| ~~**G**~~ | ~~Consortium tie-ups~~ | Not Applicable | |

**Explanatory Notes for the PQR (unless otherwise specified in the PQR):**

**Explanatory Notes for PQR B.1 (Technical)**

1. The evaluation currency for this tender shall be INR.
2. For the criteria (B.1), actual executed value shall be considered**.**

3. Value of work is to be updated with indices for "All India Avg. Consumer Price index for industrial workers" and "Monthly Whole Sale Price Index for All Commodities" with base month as per last month of work execution and indexed up to three (3) months prior to the month of latest due date of bid submission as per following formula-

$$P = R + 0.425 \times R \times \frac{(X_N - X_0)}{X_0} + 0.425 \times R \times \frac{(Y_N - Y_0)}{Y_0}$$

Where
P = Updated value of work
R = Value of executed work

$X_N$ = All India Avg. Consumer Price index for industrial workers for three months prior to the month of latest due date of bid submission (e.g. If latest bid submission date is 02-Mar-17, then bid submission month shall be reckoned as March'17 and index for Dec'2016 shall be considered).

$X_0$ = All India Avg. Consumer Price index for industrial workers for last month of work execution

$Y_N$ = Monthly Whole Sale Price Index for All Commodities for three months prior to the month of latest due date of bid submission (e.g. If latest bid submission date is 02-Mar-17, then bid submission month shall be reckoned as March'17 and index for Dec'2016 shall be considered).

$Y_0$ = Monthly Whole Sale Price Index for All Commodities for last month of work execution

**Explanatory Notes for Technical Criteria (B2):**

1. VOID
2. Unless otherwise specified, for the purpose of "B2 Technical Criteria", the word 'EXECUTED' means achievement of milestones as defined below -
    a. "ACHIEVEMENT OF PHYSICAL QUANTITIES" as per PQRs.
    b. "READINESS FOR COAL FILLING" of at least one Bunker, in respect of Mill Bunker Structure.
    c. "CHARGING" in respect of Power Transformers/ Bus Ducts/ "HT/LT Switchgears" / "HT/LT Cabling".
    d. For C&I works: "SYNCHRONISATION" in case of power project (Excluding Nuclear Projects) / "WORK EXECUTION of the value as defined in PQR" in case of industry & Nuclear Projects.
    **e. "**BOILER LIGHT UP" in respect of Boiler / CFBC / ESP.
    f. "CHARGING OF ATLEAST ONE PASS" in respect of ESP(R&M)
    g. "GAS IN" in respect of HRSG.
    h. "STEAM BLOWING" in respect of Power Cycle Piping.
    i. "HYDRAULIC TEST"/ ANY OTHER EQUIVALENT TEST LIKE "100% RT/UT OF WELDED JOINTS" of the system in respect of Pressure parts/ LP Piping/CW Piping.
    j. "FULL LOAD OPERATION OF THE UNIT" in respect of Insulation work.
    k. "SYNCHRONISATION" in respect of STG / GTG.
    l. "SPINNING" in respect of HTG.
    m. "GAS IN" in respect of FGD
3. Boiler means HRSG or WHRB or any other types of Steam Generator.
4. Power Cycle piping means Main Steam, Hot Reheat, Cold Reheat, HP Bypass.
5. For the purpose of evaluation of the PQR, one MW shall be considered equivalent to 3.5 TPH where ever rating of HRSG/BOILER is mentioned in MW. Similarly, where ever rating of Gas Turbine is mentioned in terms of Frame size, ISO rating of the same in terms of MW shall be considered for evaluation.

**Explanatory Notes for PQR -C (Financial):**

**C-1:**

i. Bidder to submit Audited Balance Sheet and Profit and Loss Account for the respective years as indicated against C-1 above.
ii. Evaluation of Turnover criteria shall be calculated from the Audited Balance Sheet and Profit & Loss Account for the three Financial Years (FY).
iii. In case audited Financial statements have not been submitted for all the three years as indicated against C-1 above, then the applicable audited statements submitted by the bidders against the requisite three years, will be averaged for three years.
iv. If financial statements are not required to be audited statutorily, then instead of audited financial statements, financial statements are required to be certified by Chartered Accountant.

**C-2:** Net Worth (Only in case of companies) of the bidder should be positive.

**Note:** Net worth shall be calculated based on the latest Audited Accounts as furnished for 'C-1' above.
Net worth = Paid up share capital + Reserves

**C-3:** Bidder must have earned profit in any one of the three financial years as applicable in the last three financial years as furnished for 'C-1' above.

**Note:** PROFIT shall be PBT earned during any one year of last three financial years as in 'C-1' above.

**C-4:** Bidder must not be under Bankruptcy Code Proceedings (IBC) by NCLT or under Liquidation / BIFR, which will render him ineligible for participation in this tender, and shall submit undertaking to this effect.

**Common Explanatory Notes:**

1. For evaluation of PQR, in case Bidder alone does not meet the pre-qualifying technical criteria B1 above, bidder may utilize the experience of its Parent/ Subsidiary Company along with its own experience, subject to following:
   a. The parent company shall have a controlling stake of ≥50% in the subsidiary company (as per Format-1).
   b. The Parent Company/ Subsidiary Company of which experience is being utilized for bidding shall submit Security Deposit(SD) equivalent to 1% of the total contract value
   c. The parent/ subsidiary company and bidder shall provide an undertaking that they are jointly or severally responsible for successful performance of the contract (as per Format-2).
   d. In case Bidder is submitting bid as a Consortium Partner, option of utilizing experience of parent/subsidiary Company can be availed by Prime Bidder only.
   e. Parent Company/ Subsidiary Company of which experience is being used for bidding, cannot participate as a 'Standalone Bidder' or as a 'Consortium bidder'.
2. Completion date for achievement of the technical criteria specified in the 'B' above should be in the last 7 years ending on the 'latest date of Bid Submission' of Tender irrespective of date of the start of work. Completion date shall be reckoned from the " Financial Year quarter of bid submission". (for e.g. -Work completed on 01.01.2014 shall be considered even if latest date of bid submission is 20.03.2021).
3. "Executed" means the bidder should have achieved the technical criteria specified in the Common QR even if the Contract has not been completed or closed.
4. In case the Experience/PO/WO certificate enclosed by bidders do not have separate break up of prices for the E&C portion for Electrical and C&I works (i.e. the certificates enclosed are for composite order for supply and erection of Electrical and C&I and other works if any), then value of Erection & Commissioning for the Electrical and C&I portion shall be considered as 15% of the price for supply & erection of Electrical and C&I.
5. Following shall be complied with in case of consortium:
   a. The Prime Bidder and Consortium Partner(s) are required to enter in to a consortium agreement and certify to BHEL regarding existence and validity of their consortium agreement in line with validity period mentioned in NIT.
   b. Prime Bidder and Consortium partners shall be approved by Customer for being considered for the tender (applicable if customer approval is required).
   c. Number of partners including prime Bidder shall be NOT more than 3 (three).
   d. Prime Bidder alone shall necessarily comply with "B1Technical Criteria" except for mechanical package where B1 criteria is not applicable.
   e. Prime Bidder and Consortium Partner shall together comply with the 'Pre-Qualification Requirements' specified for the respective category of technical requirement as per "B2 technical criteria".
   f. Prime Bidder shall comply with all other Pre Qualifying criteria for the Tender unless otherwise specified.
   g. All other conditions shall be read in conjunction with clause no 23.0 of NIT.

h. Prime Bidder shall be the Bidder who has a major share of work.
i. Prime Bidder shall be responsible for the overall execution of the Contract.
j. Performance shall be evaluated for Prime Bidder and the Consortium partner for their respective scope of work.
k. In case the Consortium partner backs out, another consortium partner meeting the QRs, has to be engaged by Prime Bidder and if not, the respective work will be withdrawn and executed on risk and cost basis of the prime bidder.
l. In case Prime Bidder withdraws or insolvency / liquidation / winding up proceedings have been initiated / admitted against the Prime Bidder, BHEL reserves the right to cancel, terminate or short close the contract or take any other action to safeguard BHEL's interest in the Project / Contract. This action will be without prejudice to any other action that BHEL can take under Law and the Contract to safeguard interests of BHEL
m. After successful execution of one work with a consortium partner under direct orders of BHEL, the Prime Bidder shall be eligible for becoming a 'standalone' bidder for works similar to that for which consortium partner was engaged, for subsequent tenders.
n. The Consortium partner shall submit SD equivalent to 1% of the total contract value in addition to the SD to be submitted by the Prime Bidder for the total contract value.

BIDDER SHALL SUBMIT ABOVE PRE-QUALIFICATION CRITERIA FORMAT, DULY FILLED-IN, SPECIFYING RESPECTIVE ANNEXURE NUMBER AGAINST EACH CRITERIA AND FURNISH RELEVANT DOCUMENT INCLUSIVE OF WORK ORDER AND WORK COMPLETION CERTIFICATE ETC IN THE RESPECTIVE ANNEXURES IN THEIR OFFER.

**Credentials submitted by the bidder against "PRE QUALIFYING CRITERIAS" shall be verified for its authenticity. In case, any credential (s) is/are found unauthentic, offer of the bidder is liable to the rejection. BHEL reserves the right to initiate any further action as per extant guidelines for Suspension of Business Dealings.**

Format-1

**Certificate for relationship between Parent Company / Subsidiary Company and the bidder**

To,
.....

.....

Dear Sir,

**Sub:** Bid for NIT No .....dated..... for "....." (name of the tender).

We hereby certify that M/s..... is Parent Company/ Subsidiary Company of M/s.....(the bidder) and details of equity holding of the Parent Company in Subsidiary Company as on .....(not earlier than seven days prior to the Bid Submission Date) are given as below:

| Name of Parent Company | Name of Subsidiary Company | Percentage of Equity Holding of Parent Company in Subsidiary Company |
|---|---|---|
| | | |

**(Insert Name and Signature of Statutory Auditor or practicing Company Secretary of the Bidder)**

Format-2

**Undertaking from the Parent Company/ Subsidiary Company of the bidder**

***(On the Letter Head of Parent Company/ Subsidiary Company, as applicable)***

From,
Name:
Full Address:

Telephone No.:
E-mail address:
Fax/No.:

To,
.....
.....

Dear Sir,

We refer to the NIT No ..... dated..... for "....." (name of the Tender).

"We have carefully read and examined in detail the NIT/Tender Terms and Conditions, including in particular, Clause .... of the NIT/Tender, regarding submission of an Undertaking, as per the prescribed Format 1 of the NIT/ Tender.

We confirm that M/s.....(the Bidder) has been authorized by us to use our Technical capability for meeting the Technical Criteria as specified in Clause.....of the PQR of the NIT/Tender referred above.

We agree to submit the Security Deposit equivalent to 1% of the total contract value in addition to Security Deposit to be submitted by Bidder as per Clause.....of the NIT/Tender for fulfillment of all obligations in terms of provisions of the contract, in the event of .....(the Bidder) being selected as the Successful Bidder.

We confirm that we along with M/s.....(the bidder), are jointly or severally responsible for successful performance of the contract.
We confirm that our company shall not participate in the above tender as a 'Standalone Bidder' or as a 'Consortium bidder' and also shall not authorize any other bidder to use our Technical capability for the above tender.

All the terms used herein but not defined, shall have the meaning as ascribed to the said terms under the referred NIT/Tender.

**Signature of Managing Director/Authorized signatory of Parent/ Subsidiary Company**

ANNEXURE-2

## CHECK LIST

**NOTE: - Tenderers are required to fill in the following details and no column should be left blank**

| | | | |
|---|---|---|---|
| 1 | Name and Address of the Tenderer | | |
| 2 | Details about type of the Firm/Company | | |
| 3.a | Details of Contact person for this Tender | Name : Mr/Ms<br>Designation:<br>Telephone No:<br>Mobile No:<br>Email ID:<br>Fax No: | |
| 3.b | Details of alternate Contact person for this Tender | Name : Mr/Ms<br>Designation:<br>Telephone No:<br>Mobile No:<br>Email ID:<br>Fax No: | |
| 4 | EMD DETAILS | DD No: Date :<br>Bank : Amount:<br>Please tick ( √ ) whichever applicable:-<br>~~ONE TIME EMD /~~ ONLY FOR THIS TENDER | |
| 5 | Validity of Offer | TO BE VALID FOR SIX MONTHS FROM DUE DATE | |
| | | APPLICABILITY (BY BHEL) | ENCLOSED BY BIDDER |
| 6 | Whether the format for compliance with **PRE QUALIFICATION CRITERIA** (ANNEXURE-I) is understood and filled with proper supporting documents referenced in the specified format | Applicable | YES / NO |
| 7 | Audited profit and Loss Account for the last three years | Applicable/~~Not Applicable~~ | YES/NO |
| 8 | Copy of GST & PAN Card | Applicable/~~Not Applicable~~ | YES/NO |
| 9 | Whether all pages of the Tender documents including annexures, appendices etc. are read understood and signed | Applicable/~~Not Applicable~~ | YES/NO |
| 10 | Integrity Pact | Applicable/~~Not Applicable~~ | YES/NO |
| 11 | Offer Forwarding Letter / Tender Submission Letter | Applicable/~~Not Applicable~~ | YES/NO |
| 12 | Declaration by Authorized Signatory | Applicable/~~Not Applicable~~ | YES/NO |
| 13 | No Deviation Certificate | Applicable/~~Not Applicable~~ | YES/NO |

| | | | |
|---|---|---|---|
| 14 | Declaration confirming knowledge about Site Conditions | Applicable/~~Not Applicable~~ | YES/NO |
| 15 | Declaration for relation in BHEL | Applicable/~~Not Applicable~~ | YES/NO |
| 16 | Non-Disclosure Certificate | Applicable/~~Not Applicable~~ | YES/NO |
| 17 | Bank Account Details for E-Payment | Applicable/~~Not Applicable~~ | YES/NO |
| 18 | Capacity Evaluation of Bidder for current Tender | ~~Applicable~~/Not Applicable | YES/NO |
| ~~19~~ | ~~Tie Ups/Consortium Agreement are submitted as per format~~ | ~~Applicable~~/Not Applicable | YES/ NO |
| 20 | Power of Attorney for Submission of Tender/Signing Contract Agreement<br><br>~~Power of Attorney of Consortium Partner.~~ | Applicable/~~Not Applicable~~ | YES/NO |
| 21 | Analysis of Unit rates | Applicable/~~Not Applicable~~ | YES/NO |
| 22 | Annexure-5: Authorization of representative who will participate in the online Reverse Auction Process | Applicable/~~Not Applicable~~ | YES/NO |
| 23 | Annexure-6: RA Price Confirmation and Breakup | Applicable/~~Not Applicable~~ | YES/NO |
| 24 | Annexure-8: Undertaking as per PQR C4 of Annexure-1 i.e. PQR | Applicable/~~Not Applicable~~ | YES/NO |
| 25 | Annexure-9: Declaration reg. Related Firms & their areas of Activities (x) Other Tender documents as per this NIT. | Applicable/~~Not Applicable~~ | YES/NO |
| 26 | Annexure-10 Declaration regarding minimum local content | Applicable/~~Not Applicable~~ | YES/NO |
| 27 | Annexure-11: Declaration regarding compliance to restrictions under rule 144 (xi) of GFR 2017 | Applicable/~~Not Applicable~~ | YES/NO |

NOTE: STRIKE OFF 'YES' OR 'NO', AS APPLICABLE. TENDER NOT ACCOMPANIED BY THE PRESCRIBED **ABOVE APPLICABLE DOCUMENTS** ARE LIABLE TO BE SUMMARILY REJECTED.

**DATE :**

**AUTHORISED SIGNATORY**

**(With Name, Designation and Company seal)**

ANNEXURE-3

**Certificate by Chartered Accountant on letter head**

(applicable upto 31st March'2021 in line with MSME notification no. S.O. 2119 (E), dated 26th June'2020)

This is to Certify that M/S ....., (hereinafter referred to as 'company') having its registered office at ..... is registered under MSMED Act 2006, (Entrepreneur Memorandum No (Part—II)/ Udyam Registration Certificate No. ..... dtd: ....., Category: .....(Micro/Small/Medium). (Copy enclosed).

Further verified from the Books of Accounts that the investment of the company as per the latest audited financial year..... ..... as per MSMED Act 2006 is as follows:

1. **For Manufacturing Enterprises:** Investment in plant and machinery (i.e. original cost excluding land and building and the items specified by the Ministry of Small Scale Industries vide its notification No. S.O.1722(E) dated October 5, 2006:
Rs..... Lacs

2. **For Service Enterprises:** Investment in equipment (original cost excluding land and building and furniture, fittings and other items not directly related to the service rendered or as may be notified under the **MSMED** Act, 2006:
Rs..... Lacs

3. **For Enterprises** (having EM-II Certificate/ valid NSIC Certificate or Udyog Aadhar Memorandum): Investment in plant and machinery or equipment is Rs..... Lacs and turnover is Rs. ..... Lacs (as notified in MSME notification no. S.O. 2119 (E) dated 26.06.2020)

4. **For Enterprises** (having EM-II Certificate/ valid NSIC Certificate or Udyog Aadhar Memorandum): Investment in plant and machinery or equipment is Rs..... Lacs and turnover is Rs. ..... Lacs (as notified in MSME notification no. S.O. 2119 (E) dated 26.06.2020)

**(Strike off whichever is not applicable)**

The above investment of Rs ..... ..... Lacs is within permissible limit of Rs ..... Lacs for ..... Micro / Small/ Medium *(Strike off which is not applicable)* Category under MSMED Act 2006.

Or

The enterprise has been graduated upward from its original category (micro/small/medium) (*strike off which is not applicable*), the enterprise shall maintain its prevailing status till expiry of one year from the close of year of registration, as notified vide S.O. No. 2119 (E) dated 26.06.2020 published in the gazette notification dated 26.06.2020 by Ministry of MSME.

Or

The enterprise has been reverse graduated from its original category (micro/small/medium) (*strike off which is not applicable*), the enterprise will continue in its present category till the closure of the financial year and it will be given the benefit of the changed status only with effect from 1st April of the financial year following the year in which such change took place, as notified vide S.O. No. 2119 (E) dated 26.06.2020 published in the gazette notification dated 26.06.2020 by Ministry of MSME.

Date:

(Signature)

Name:
Membership Number:
Seal of the Chartered Accountant

**ANNEXURE-4**

**Reverse Auction Process Compliance Form**

## (The bidders are required to print this on their company's letterhead and sign, stamp before RA)

To

- M/s. {*Service provider*
- *Postal address}*

**Sub: Agreement to the Process related Terms and Conditions**

Dear Sir,

This has reference to the Terms & Conditions for the Reverse Auction mentioned in the RFQ document for {Items} against BHEL enquiry/ RFQ no. { BHE/PW/PUR/TLRPT-CPS/2630} dt. {…….}
This letter is to confirm that:

1) The undersigned is authorized official/ representative of the company to participate in RA and to sign the related documents.
2) We have studied the Reverse Auction guidelines (as available on www.bhel.com), and the Business rules governing the Reverse Auction as mentioned in your letter and confirm our agreement to them.
3) We also confirm that we have taken the training on the auction tool and have understood the functionality of the same thoroughly.
4) We also confirm that, in case we become L1 bidder, we will FAX/ email the price confirmation & break up of our quoted price as per *Annexure - 6* within **two** working days (of BHEL) after completion of RA event, besides sending the same by registered post/ courier both to M/s. BHEL and M/s. {*Service provider.}*

We, hereby confirm that we will honor the Bids placed by us during the auction process.

With regards

Signature with company seal

Name:
Company / Organization:
Designation within Company / Organization:
Address of Company / Organization:

**Sign this document and FAX/ email it to M/s *{Service provider}* at *{……..}* prior to start of the Event.**

**ANNEXURE-5**

**Authorization of representative who will participate in the on line Reverse Auction Process:**

| | | |
|---|---|---|
| 1 | NAME OF THE BIDDER | |
| 2 | NAME & DESIGNATION OF OFFICIAL | |
| 3 | POSTAL ADDRESS (COMPLETE) | |
| 4 | TELEPHONE NOS. (LAND LINE & MOBILE BOTH) | |
| 5 | E-MAIL ADDRESS | |
| 6 | NAME OF PLACE/ STATE/ COUNTRY, WHEREFROM S/HE WILL PARTICIPATE IN THE REVERSE AUCTION | |

**ANNEXURE-6**

# Reverse Auction price confirmation and breakup
## (To be submitted by L1 bidder after completion of Reverse Auction)

To
- M/s. *Service provider*
- *Postal address*

CC: M/s BHEL
BHEL-PSWR, 345, KINGSWAY, NAGPUR-440001

Sub: **Final price quoted during Reverse Auction and price breakup**

Dear Sir,

We confirm that we have quoted.

**Rs.{____in value & in words_____} for item(s) covered under tender enquiry No. {** BHE/PW/PUR/TLRPT-CPS/2630**} dt.{…}**

Total price of the items covered under above cited enquiries is inclusive of {*Packing & forwarding, GST, E.D., C.S.T., freight and insurance charges up to {……} District,{……} State and Type Test Charges etc., (exclusive of service tax), other as per NIT*}

as our final landed prices as quoted during the Reverse Auction conducted today {*date*} which will be valid for a period of {___ **in nos. & in words** ___} days.

The price break-up is as given below.

========
Total - Rs. **in value & in words**
========

Yours sincerely,

For _____

**Name:**
**Company:**
**Date:**
**Seal:**

**ANNEXURE-7**

## INTEGRITY PACT

**Between**

Bharat Heavy Electricals Ltd. (BHEL), a company registered under the Companies Act 1956 and having its registered office at "BHEL House", Siri Fort, New Delhi -110049 (India) hereinafter referred to as "The Principal", which expression unless repugnant to the context or meaning hereof shall include its successors or assigns of the ONE PART

**and**

_____, (description of the party along with address), hereinafter referred to as "The Bidder/ Contractor" which expression unless repugnant to the context or meaning hereof shall include its successors or assigns of the OTHER PART

### Preamble

The Principal intends to award, under laid-down organizational procedures, contract/s for **E-Tender Spec No:** BHE/PW/PUR/TLRPT-CPS/2630 (Job Description: PROVIDING CONSTRUCTION POWER SYSTEM INCLUDING DESIGN, PROCUREMENT OF EQUIPMENT, INSTALLATION INCLUDING CIVIL WORKS, ERECTION,TESTING & COMMISSIONING, OPERATION & MAINTENANCE COMPRISING OF 6.6/11kV SUBSTATION, 11 KV POWER DISTRIBUTION MAIN SYSTEM , LINE, AND 11/0.433 KV PACKAGE SUBSTATIONS AND ASSOCIATED ITEMS AS DETAILED IN TECHNICAL SPECIFICATION FOR 2X660MW NTPC TALCHER PROJECT, ORISSA)

(hereinafter referred to as "Contract"). The Principal values full compliance with all relevant laws

of the land, rules and regulations, and the principles of economic use of resources, and of fairness and transparency in its relations with its Bidder(s)/ Contractor(s).

In order to achieve these goals, the Principal will appoint panel of Independent External Monitor(s) (IEMs), who will monitor the tender process and the execution of the contract for compliance with the principles mentioned above.

**Section 1-Commitments of the Principal**

1.1 The Principal commits itself to take all measures necessary to prevent corruption and to observe the following principles:

1.1.1 No employee of the Principal, personally or through family members, will in connection with the tender for, or the execution of a contract, demand, take a promise for or accept, for self or third person, any material or immaterial benefit which the person is not legally entitled to.

1.1.2 The Principal will, during the tender process treat all Bidder(s) with equity and reason. The Principal will in particular, before and during the tender process, provide to all Bidder(s) the same information and will not provide to any Bidder(s) confidential/ additional information through which the Bidder(s) could obtain an advantage in relation to the tender process or the contract execution.

1.1.3 The Principal will exclude from the process all known prejudiced persons.

1.2 If the Principal obtains information on the conduct of any of its employees which is a penal offence

under the Indian Penal Code 1860 and Prevention of Corruption Act 1988 or any other statutory penal enactment, or if there be a substantive suspicion in this regard, the Principal will inform its Vigilance Office and in addition can initiate disciplinary actions.

**Section 2 -Commitments of the Bidder(s)/ Contractor(s)**

2.1 The Bidder(s)/ Contractor(s) commit himself to take all measures necessary to prevent corruption. The Bidder(s)/ Contractor(s) commits himself to observe the following principles during participation in the tender process and during the contract execution.

2.1.1 The Bidder(s)/ Contractor(s) will not, directly or through any other person or firm, offer, promise or give to the Principal or to any of the Principal's employees involved in the tender process or the execution of the contract or to any third person any material, immaterial or any other benefit which he/ she is not legally entitled to, in order to obtain in exchange any advantage of any kind whatsoever during the tender process or during the execution of the contract.

2.1.2 The Bidder(s)/ Contractor(s) will not enter with other Bidder(s) into any illegal or undisclosed agreement or understanding, whether formal or informal. This applies in particular to prices, specifications, certifications, subsidiary contracts, submission or non-submission of bids or any other actions to restrict competitiveness or to introduce cartelization in the bidding process.

2.1.3 The Bidder(s)/ Contractor(s) will not commit any penal offence under the relevant Indian Penal Code (IPC) and Prevention of Corruption Act; further the Bidder(s)/ Contractor(s) will not use improperly, for purposes of competition or personal gain, or pass on to others, any information or document provided by the Principal as part of the business relationship, regarding plans, technical proposals and business details, including information contained or transmitted electronically.

2.1.4 Foreign Bidder(s)/ Contractor(s) shall disclose the name and address of agents and representatives in India and Indian Bidder(s)/ Contractor(s) to disclose their foreign principals or associates. The Bidder(s)/ Contractor(s) will, when presenting his bid, disclose any and all payments he has made, and is committed to or intends to make to agents, brokers or any other intermediaries in connection with the award of the contract.

2.2 The Bidder(s)/ Contractor(s) will not instigate third persons to commit offences outlined above or be an accessory to such offences.

2.3 The Bidder(s)/ Contractor(s) shall not approach the Courts while representing the matters to IEMs and shall await their decision in the matter.

**Section 3 -Disqualification from tender process and exclusion from future contracts**

If the Bidder(s)/ Contractor(s), before award or during execution has committed a transgression through a violation of Section 2 above, or acts in any other manner such as to put his reliability or

credibility in question, the Principal is entitled to disqualify the Bidder(s)/ Contractor(s) from the tender process , terminate the contract, if already awarded, exclude from future business dealings and/ or take action as per the separate "Guidelines on Banning of Business dealings with Suppliers/ Contractors", framed by the Principal.

**Section 4 -Compensation for Damages**

4.1 If the Principal has disqualified the Bidder (s) from the tender process before award / order acceptance according to Section 3, the Principal is entitled to demand and recover the damages equivalent to Earnest Money Deposit/ Bid Security.

4.2 If the Principal is entitled to terminate the Contract according to Section 3, or terminates the Contract in application of Section 3 above , the Bidder(s)/ Contractor (s) transgression through a violation of Section 2 above shall be construed breach of contract and the Principal shall be entitled to demand and recover from the Contractor an amount equal to 5% of the contract value or the amount equivalent to Security Deposit/ Performance Bank Guarantee , whichever is higher, as damages, in addition to and without prejudice to its right to demand and recover compensation for any other loss or damages specified elsewhere in the contract.

**Section 5 -Previous Transgression**

5.1 The Bidder declares that no previous transgressions occurred in the last 3 (three) years with any other company in any country conforming to the anti-corruption approach or with any other Public Sector Enterprise in India that could justify his exclusion from the tender process.

5.2 If the Bidder makes incorrect statement on this subject, he can be disqualified from the tender process or the contract, if already awarded, can be terminated for such reason or action can be taken as per the separate "Guidelines on Banning of Business dealings with Suppliers/ Contractors", framed by the Principal.

**Section 6 -Equal treatment of all Bidder (s)/ Contractor (s) / Sub-contractor (s)**

6.1 The Principal will enter into Integrity Pacts with identical conditions as this Integrity Pact with all Bidders and Contractors.

6.2 In case of Sub-contracting, the Principal Contractor shall take the responsibility of the adoption of Integrity Pact by the Sub-contractor(s) and ensure that all Sub-contractors also sign the Integrity Pact.

6.3 The Principal will disqualify from the tender process all Bidders who do not sign this Integrity Pact or violate its provisions.

**Section 7 -Criminal Charges against violating Bidders/ Contractors /Subcontractors**

If the Principal obtains knowledge of conduct of a Bidder, Contractor or Subcontractor, or of an employee or a representative or an associate of a Bidder, Contractor or Subcontractor which constitutes

corruption, or if the Principal has substantive suspicion in this regard, the Principal will inform the Vigilance Office.

**Section 8 -Independent External Monitor(s)**

8.1 The Principal appoints competent and credible panel of Independent External Monitor (s) (IEMs) for this Integrity Pact. The task of the IEMs is to review independently and objectively, whether and to what extent the parties comply with the obligations under this Integrity Pact.

8.2 The IEMs are not subject to instructions by the representatives of the parties and performs his functions neutrally and independently. He reports to the CMD, BHEL.

8.3 The IEMs shall be provided access to all documents/ records pertaining to the Contract, for which a complaint or issue is raised before them as and when warranted. However, the documents/records/information having National Security implications and those documents which have been classified as Secret/Top Secret are not to be disclosed.

8.4 The Principal will provide to the IEMs sufficient information about all meetings among the parties related to the Contract provided such meetings could have an impact on the contractual relations between the Principal and the Contractor. The parties offer to the IEMs the option to participate in such meetings.

8.5 The advisory role of IEMs is envisaged as that of a friend, philosopher and guide. The advice of IEMs would not be legally binding and it is restricted to resolving issues raised by a Bidder regarding any aspect of the tender which allegedly restricts competition or bias towards some Bidders. At the same time, it must be understood that IEMs are not consultants to the Management. Their role is independent in nature and the advice once tendered would not be subject to review at the request of the organization.

8.6 For ensuring the desired transparency and objectivity in dealing with the complaints arising out of any tendering process or during execution of Contract, the matter should be examined by the full panel of IEMs jointly, who would look into the records, conduct an investigation, and submit their joint recommendations to the Management.

8.7 The IEMs would examine all complaints received by them and give their recommendations/ views to the CMD, BHEL at the earliest. They may also send their report directly to the CVO, in case of suspicion of serious irregularities requiring legal/ administrative action. Only in case of very serious issue having a specific, verifiable Vigilance angle, the matter should be reported directly to the Commission. IEMs will tender their advice on the complaints within 30 days.

8.8 The CMD, BHEL shall decide the compensation to be paid to the IEMs and its terms and conditions.

8.9 IEMs should examine the process integrity; they are not expected to concern themselves with fixing of responsibility of officers. Complaints alleging mala fide on the part of any officer of the Principal should be looked into by the CVO of the Principal.

8.10 If the IEMs have reported to the CMD, BHEL, a substantiated suspicion of an offence under relevant Indian Penal Code / Prevention of Corruption Act, and the CMD, BHEL has not, within reasonable time, taken visible action to proceed against such offence or reported it to the Vigilance Office, the IEMs may also transmit this information directly to the Central Vigilance Commissioner, Government of India.

8.11 After award of work, the IEMs shall look into any issue relating to execution of Contract, if specifically raised before them. As an illustrative example, if a Contractor who has been awarded the Contract, during the execution of Contract, raises issue of delayed payment etc. before the IEMs, the same shall be examined by the panel of IEMs. Issues like warranty/ guarantee etc. shall be outside the purview of IEMs.

8.12 However, the IEMs may suggest systemic improvements to the management of the Principal, if considered necessary, to bring about transparency, equity and fairness in the system of procurement.

8.13 The word `Monitor' would include both singular and plural.

**Section 9 -Pact Duration**

9.1 This Integrity Pact shall be operative from the date this Integrity Pact is signed by both the parties till the final completion of contract for successful Bidder, and for all other Bidders 6 months after the Contract has been awarded. Any violation of the same would entail disqualification of the bidders and exclusion from future business dealings.

9.2 If any claim is made/ lodged during currency of this Integrity Pact, the same shall be binding and continue to be valid despite the lapse of this Pact as specified above, unless it is discharged/ determined by the CMD, BHEL.

**Section 10 -Other Provisions**

10.1 This Integrity Pact is subject to Indian Laws and exclusive jurisdiction shall be of the competent Courts as indicated in the Tender or Contract, as the case may be.

10.2 Changes and supplements as well as termination notices need to be made in writing.

10.3 If the Bidder(s)/ Contractor(s) is a partnership or a consortium or a joint venture, this Integrity Pact shall be signed by all partners of the partnership or joint venture or all consortium members.

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

10.5 Only those bidders / contractors who have entered into this Integrity Pact with the Principal would be competent to participate in the bidding. In other words, entering into this Integrity Pact would be a preliminary qualification.

10.6 In the event of any dispute between the Principal and Bidder(s)/ Contractor(s) relating to the Contract,

in case, both the parties are agreeable, they may try to settle dispute through Mediation before the panel of IEMs in a time bound manner. In case, the dispute remains unresolved even after mediation by the panel of IEMs, either party may take further action as the terms & conditions of the Contract. The fees/expenses on dispute resolution through mediation shall be shared by both the parties. Further, the mediation proceedings shall be confidential in nature and the parties shall keep confidential all matters relating to the mediation proceedings including any settlement agreement arrived at between the parties as outcome of mediation. Any views expressed, suggestions, admissions or proposals etc. made by either party in the course of mediation shall not be relied upon or introduced as evidence in any further arbitral or judicial proceedings, whether or not such proceedings relate to the dispute that is the subject of mediation proceedings. Neither of the parties shall present IEMs as witness in any Alternative Dispute Resolution or judicial proceedings in respect of the dispute that was subject of mediation.

Vivek Jaiswal 24/08/2022

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For & On behalf of the Principal

(Office Seal)

Place---------Nagpur

Date---------24/08/2022

Witness:_____

(Name & Address) _____

_____

---

For & On behalf of the Bidder/ Contractor

(Office Seal)

Witness:_____

(Name & Address) _____

_____

**ANNEXURE-8**

**UNDERTAKING**

(To be typed and submitted in the Letter Head of the Company/Firm of Bidder)

**To,**
GM-PURCHASE
BHEL-PSWR, 345, KINGSWAY, NAGPUR-440001

Dear Sir/Madam,

**Sub: DECLARATION REGARDING INSOLVENCY/ LIQUIDATION/ BANKRUPTCY PROCEEDINGS**

**Ref**: NIT/Tender Specification No: BHE/PW/PUR/TLRPT-CPS/2630

I/We,

_____

declare that, I/We am/are not under insolvency resolution process or liquidation or Bankruptcy Code Proceedings (IBC) as on date, by NCLT or any adjudicating authority/authorities, which will render us ineligible for participation in this tender.

**Sign. of the AUTHORISED SIGNATORY**
**(With Name, Designation and Company seal)**

Place:
Date:

ANNEXURE-9

**DECLARATION**

Date:_____

To,
GM-PURCHASE
BHEL-PSWR, 345, KINGSWAY, NAGPUR-440001

Sub: **Details of related firms and their area of activities**

Dear Sir/ Madam,

Please find below details of firms owned by our family members that are doing business/ registered for same item with BHEL,_____(NA, if not applicable).

| | | |
|---|---|---|
| 1 | Material Category/ Work Description | |
| | Name of Firm | |
| | Address of Firm | |
| | Nature of Business | |
| | Name of Family Member | |
| | Relationship | |
| 2 | Material Category/ Work Description | |
| | Name of Firm | |
| | Address of Firm | |
| | Nature of Business | |
| | Name of Family Member | |
| | Relationship | |
| | | |

***Note: I certify that the above information is true and I agree for penal action from BHEL in case any of the above information furnished is found to be false.***

Regards,
(
_____ )

From: M/s _____
Supplier Code: _____
Address: _____
_____

**Annexure-10**

**DECLARATION REGARDING MINIMUM LOCAL CONTENT IN LINE WITH REVISED PUBLIC PROCUREMENT (PREFERENCE TO MAKE IN INDIA), ORDER 2017 DATED 04TH JUNE, 2020 AND SUBSEQUENT ORDER(S)**

*(To be typed and submitted in the Letter Head of the Entity/Firm providing certificate as applicable)*

---

To,
GM-PURCHASE
BHEL-PSWR, 345, KINGSWAY, NAGPUR-440001

Dear Sir,

**Sub**: Declaration reg. minimum local content in line with Public Procurement (Preference to Make in India), Order 2017-Revision, dated 04th June, 2020 and subsequent order(s).

**Ref :** 1) NIT/Tender Spec No: BHE/PW/PUR/TLRPT-CPS/2630,
2) All other pertinent issues till date

We hereby certify that the items/works/services offered by…… *(specify the name of the organization here)* has a local content of _____ **%** and this meets the local content requirement for **'Class-I local supplier' / 'Class II local supplier' **** as defined in Public Procurement (Preference to Make in India), Order 2017-Revision dated 04.06.2020 issued by DPIIT and subsequent order(s).

The details of the location(s) at which the local value addition is made are as follows:

1. _____ 2. _____
3. _____ 4. _____

…
…
…

Thanking you,
Yours faithfully,

**(Signature, Date & Seal of Authorized Signatory of the Bidder)**

****** - *Strike out whichever is not applicable.*

**Note:**

1. Bidders to note that above format Duly filled & signed by authorized signatory, shall be submitted along with the techno-commercial offer.
2. In case the bidder's quoted value is in excess of Rs. 10 crores, the authorized signatory for this declaration shall necessarily be the statutory auditor or cost auditor of the company (in the case of companies) or a practising cost accountant or practicing chartered accountant (in respect of suppliers other than companies).
3. In the event of false declaration, actions as per the above order and as per BHEL Guidelines shall be initiated against the bidder.

**ANNEXURE-11**

**DECLARATION REGARDING COMPLIANCE TO RESTRICTIONS UNDER RULE 144 (xi) OF GFR 2017**

*(To be typed and submitted in the Letter Head of the Entity/Firm providing certificate as applicable)*

---

To,
GM-PURCHASE
BHEL-PSWR, 345, KINGSWAY, NAGPUR-440001

Dear Sir,

**Sub**: Declaration regarding compliance to Restrictions under Rule 144 (xi) of GFR 2017

**Ref :** 1) NIT/Tender Spec No: BHE/PW/PUR/TLRPT-CPS/2630,
2) All other pertinent issues till date

I have read the clause regarding restrictions on procurement from a bidder of a country which shares a land border with India and on sub-contracting to contractors from such countries. I certify that _____ *(specify the name of the organization here)*,

a. is not from such a country ☐

*b.* has been registered with the Competent Authority *(attach valid registration by the Competent Authority, i.e., the Registration Committee constituted by the Dept. for Promotion of Industry and Internal Trade (DPIIT))*; ☐

and will not sub-contract any work to a contractor from such countries unless such contractor is registered with the Competent Authority. *(attach relevant valid registration, if applicable)*

I hereby certify that we fulfill all requirements in this regard and is eligible to be considered.

Thanking you,
Yours faithfully,

**(Signature, Date & Seal of**
**Authorized Signatory of the Bidder)**

**Note:** Bidders to note that in case above certification given by a bidder, whose bid is accepted, is found to be false, then this would be a ground for immediate termination and for taking further action in accordance with law and as per BHEL guidelines.

**ANNEXURE-12**

# IMPORTANT INFORMATION

**E -Tender** for this work is invited by BHEL PSWR NAGPUR and offer shall be submitted through BHEL e-procurement portal only. All correspondences regarding this tender shall be through E-procurement portal.

**Postal Address:**
GM /Purchase BHEL PSWR,
SRIMOHINI COMPLEX, Floor No. 5 & 6, 345 KINGSWAY, NAGPUR 440001, INDIA

Following are the concerned BHEL officials to whom bidders can contact in case of any difficulty:

Manager Purchase, Email: Vivekjha@bhel.in , Mob: 9429198214

DGM Purchase, Email: kamleshbhel@bhel.in, Ph: +91-712-3048-645

GM Purchase, Email: rmalhotra@bhel.in . Ph: +91-712- 2858-633

1. **Refer the abridged version of extant 'Guidelines for suspension of business dealings with suppliers/ contractors' which is available at www.bhel.com on "supplier registration page" at the following link:** https://www.bhel.com/sites/default/files/suspension_guidelines_abridged.pdf

2. **"Pradhan Mantri Kaushal Vikas Yojna:** The contractor shall, at all stages of work deploy skilled/semi-skilled tradesmen who are qualified and possess certificate in particular trade from CPWD Training Institute/Industrial Training Institute/ National Institute of Construction Management and Research (NICMAR), National Academy of Construction, CIDC or any similar reputed and recognized Institute managed/ certified by State/ Central Government. The number of such qualified tradesmen shall not be less than 20% of total skilled/semi-skilled workers required in each trade at any stage of work. The contractor shall submit number of man days required in respect of each trade, its scheduling and the list of qualified tradesmen along with requisite certificate from recognized Institute to Engineer-in-Charge for approval. Notwithstanding such approval, if the tradesmen are found to have inadequate skill to execute the work of respective trade, the contractor shall substitute such tradesmen within two days of written notice from Engineer-in-Charge. Failure on the part of contractor to obtain approval of Engineer-in–Charge or failure to deploy qualified tradesmen will attract a compensation to be paid by contractor at the rate of Rs.100 per such tradesman per day. Decision of Engineer-in-Charge as to whether particular tradesman possesses requisite skill and amount of compensation in case of default shall be final and binding".

3. **All Statutory Requirements as applicable for this project shall be complied with.**

4. **BHEL Fraud Prevention Policy: "The Bidder along with its associate/ collaborators/ sub-contractors/ sub-vendors/ consultants/ service providers shall strictly adhere to BHEL Fraud Prevention Policy displayed on BHEL website http://www.bhel.com and shall immediately bring to the notice of BHEL Management about any fraud or suspected fraud as soon as it comes to their notice."**

5. **The following clause is added under clause 1.10 Security Deposit in Vol-1C:**

**Clause No 1.10.8 of Vol-IC General Conditions of Contract:** Timely Submission of Security Deposit for Execution of the contract: "Bidder agrees to submit Security Deposit required for execution of the contract within the time period mentioned. In case of delay in submission of Security Deposit, enhanced Security Deposit which would include interest (Base rate of SBI +6%) for the delayed period, shall be submitted by the bidder. Further, if Security Deposit is not submitted till such time the first bill becomes

due, the amount of Security Deposit due shall be recovered as per terms defined in NIT/contract, from the bills along with due interest."

**6. Following clause shall form part of the HSE documents issued under Chapter IX of Volume IB 'Special Conditions of Contract'**

"In case of any financial deduction made by Customer for lapses of safety other than what is provided elsewhere in the contract, the same shall be charged on back-to-back basis on the defaulting contractor without prejudice to any other right spelt anywhere in the tender /contract".

**7. BHEL Fraud Prevention Policy: "The Bidder along with its associate/ collaborators/ sub-contractors/ sub-vendors/ consultants/ service providers shall strictly adhere to BHEL Fraud Prevention Policy displayed on BHEL website http://www.bhel.com and shall immediately bring to the notice of BHEL Management about any fraud or suspected fraud as soon as it comes to their notice."**

**8. The clause 2.7.9.1 below is added under the heading "Rights of BHEL" of General Conditions of Contract Volume-IC GCC:**

**2.7.9.1** Provision of Penalty in case of slippage of Intermediate Milestones:

i) Two major Intermediate Milestones are mentioned as M1 & M2 in Chapter VI: Time Schedule of Vol IA Technical Conditions of Contract.
ii) In case of slippage of these identified Intermediate Milestones, Delay Analysis shall be carried out on achievement of each of these two Intermediate Milestones in reference to Form 14.
iii) In case delay in achieving M1 Milestone is solely attributable to the contractor, 0.5% per week of Executable Contract Value*, limited to maximum 2% of Executable Contract Value, will be withheld.
iv) In case delay in achieving M2 Milestone is solely attributable to the contractor, 0.5% per week of Executable Contract Value*, limited to maximum 3% of Executable Contract Value, will be withheld.
v) Amount already withheld, if any against slippage of M1 milestone, shall be released only if there is no delay attributable to contractor in achievement of M2 Milestone.
vi) Amount required to be withheld on account of slippage of identified intermediate milestone(s) shall be withheld out of respective milestone payment and balance amount (if any) shall be withheld @10% of RA Bill amount from subsequent RA bills.
vii) Final deduction towards LD (if applicable as per clause 2.7.9 above), on account of delay attributable to contractor shall be based on final delay analysis on completion / closure of contract. Withheld amount, if any due to slippage of identified intermediate milestone(s) shall be adjusted against LD or released as the case may be.
viii) In case of termination of contract due to any reason attributable to contractor before completion of work, the amount already withheld against slippage of intermediate milestones shall not be released and be converted into recovery.

* **Executable Contract Value** - Value of work for which inputs/ fronts were made available to contractor and were scheduled for execution till the date of achievement of that milestone.

**9. Following clause of Volume-I-C-General Conditions of Contract clause shall not be applicable for this contract: NIL**

**10. Commencement Period for "Performance Guarantee for Workmanship" as per clause no 2.24 of Vol-IC GCC**: This period shall commence after the completion of work as certified by Engineer-in-Charge**.**

**11. Acceptance of Bank Guarantee (BG)-**
**Revision in Acceptance of Bank Guarantee (BG) Clause no. 1.10.3 (iii) of Vol I C GCC:**

**Clause No. 1.10.3 (iii) of Vol IC GCC is revised as below: -**

"Bank Guarantee issued by:

a. Any of the BHEL consortium bank listed below:

State Bank of India
ABN Amro Bank N.V.
Bank of Baroda
Canara Bank
Citi Bank N.A.
Corporation Bank
Deutsche Bank
HDFC Bank Ltd.
The Hongkond and Shanghai Banking Corporation Ltd
ICICI Bank Ltd.
IDBI Ltd.
Punjab National Bank
Standard Chartered Bank
State Bank of Travancore
State Bank of Hyderabad
Syndicate Bank

b. Any public sector Bank (other than consortium banks) with a clause in the text of Bank Guarantee that "**It is enforceable at Nagpur, Maharashtra**".

c. Any private sector banks, with a clause in the text of Bank Guarantee that "**It is enforceable by being presented at any branch of the bank**".

**Note: "Bank Guarantees issued by Co-operative Banks are not acceptable".**

**12. Broad Terms & Conditions of Reverse Auction:**

*In continuation to Clause 19.0 of NIT (Notice Inviting Tender) following are the broad terms and conditions of Reverse Auction:*

*"BHEL shall be resorting to Reverse Auction (RA) (Guidelines as available on www.bhel.com) (https://www.bhel.com/guidelines-reverse-auction-2021) for this tender. RA shall be conducted among the techno-commercially qualified bidders.*

*Price bids of all techno-commercially qualified bidders shall be opened and same shall be considered for RA. In case any bidder(s) do(es) not participate in online Reverse Auction, their sealed envelope price bid along with applicable loading, if any, shall be considered for ranking."*

*Note:-*

*1. No benefits to MSE bidders w.r.t Reverse Auction Guidelines as available on www.bhel.com against works contract.*

*2. In case of enquiry through e-procurement the sealed electronic price bid (e-bid) is to be treated as sealed envelope price bid.*

**13.** **Bidders kindly to take note that EMD (Earnest Money Deposit) shall be furnished by MSE bidders as well, as per the amount and pocedure indicated in the NIT/GCC.**

# TECHNICAL CONDITIONS OF CONTRACT (TCC)
# CONTENTS

**1.0 PROJECT INFORMATION**

2x660 MW NTPC TALCHER is being set up by NTPC

| S. No. | Description | Details |
|---|---|---|
| 1.1 | **Location** | TALCHER |
| 1.2 | **Nearest Railway Station** | ANGUL |
| 1.3 | **Nearest Airport** | Bhubaneshwar |

The bidder is advised to visit and examine the site of WORKS and its surroundings and obtain for himself on his own responsibility all information that may be necessary for preparing the bid and entering into the contract. All costs for and associated with site visits shall be borne by the bidder.

## 2.0 DESCRIPTION AND SCOPE OF CONSTRUCTION POWER DISTRIBUTION SYSTEM

PROVIDING CONSTRUCTION POWER SYSTEM ON CONSISTING OF:

- 6 km of underground HT (6.6kV) cable laying from incomer feeders (feeder shall be provided by customer) to 6.6/11kV substation.
- 01 no. 6.6/11kV substation consisting of 2 Nos 6.6kV RMU Panel (Ring main Unit), 2 nos. 5MVA 6.6/11kV Transformers, 02 nos. 11kV RMU Panel and other allied works.
- 12 nos package substations of rating 500kVA, 11/0.433kV each & 04 nos of rating 500kVA, 11/.433kV Oil filled transformers. All the substations shall be connected to 11kV ring main feeder through 11kV Overhead line and underground cable.
- 15km of overhead lines of ring main system for Construction Power.
- Nitrogen Injection Fire Protection System for 5MVA Transformers.
- Yard Lighting: stepped tubular/ swaged type long steel lighting poles. Each pole shall have one flood lights.
- Any other work which required to complete the job.
- Operation & Maintenance.

## 2.1 BROAD SCOPE OF WORK:

**THE SCOPE OF THE WORK WILL COMPRISE OF BUT NOT LIMITED TO THE FOLLOWING: (All the works mentioned hereunder shall be carried out within the accepted rate unless otherwise specified.)**

The scope of work (Package-A and Package-B) covers the supplying, obtaining statutory clearance, erecting, testing, commissioning and maintaining of the following.

- E&C of 6 km of underground HT (6.6kV) (1Cx630sqmm) cable from incoming feeder to substation. The incoming feeder shall be provided by the customer at 6.6kV of existing switchyard. The entire scope of construction power network beyond this point is included in this scope with major components mentioned below excluding BHEL supplied materials mentioned explicitly in this contract.
- Supply and E&C of Ring Main Unit (RMU) Panel (outdoor): 6.6 kV (02 nos).
- Supply and E&C of Ring Main Unit (RMU) Panel (outdoor):: 11kV (02 nos).
- Supply and E&C of 6.6kV/11kV 5MVA Transformers (02 nos.)
- Supply of required balance materials, erection, commissioning and maintenance of 01 no substation of 6.6/11kV (2x5MVA Transformers.)
- Supply and E&C of all materials for Nitrogen Injection Fire Protection System for 5 MVA Transformers.
- Supply and E&C of 15km of ACSR dog conductor (5km of overhead lines) of ring main system for Construction Power. This length is tentative and the detailed engineering (part of this scope) will decide the actual requirement.
- E&C of 12 nos package substations of rating 500 kVA, 11/0.433kV each.
- E&C of 04 nos oil filled transformers of rating 500 kVA, 11/.433kV each.
- E&C of 02 nos of 11kV VCB.
- Supply & E&C of 02 nos 11kV VCB suitable for 500kVA oil filled transformer mentioned above.

- Supply & E&C of 04 nos LT distribution board suitable for 500kVA oil filled transformer mentioned above.
- Supply of required balance materials, erection, commissioning and maintenance of 16 nos. of 11kV/ 433V - 500 kVA substations (12 nos Package substation and 04 nos conventional substation).
- E&C of approximately 6 km of underground HT (11kV) cable for ring main system.
- Supply of required materials, installation, laying, termination of 11 kV Overhead line / underground cable for power distribution and maintenance of 11 kV feeder power distribution systems.
- Any other items that are required for completion of construction power supply system in accordance to the applicable standards but not explicitly mentioned in the contract within the quoted rates.
- Supply of materials and erection of Lighting Distribution Board / LT Power Kiosk for 415V 400 A Incomer with MCCB (TPN) and outgoing feeder having MCCBs of 200 A -2 nos., MCCBs/ RCCBs of 100A- 1 no., MCCBs/ RCCBs 63 A- 2 no. for further distribution.
- Sectional isolations in 11kV are to be provided at different locations by using Triple-Pole Gang-Operated AB Switch with earthing switch. Lightening Arrestors are to be provided in the HT side of 11/0.433 kV transformers. The location of sectional isolation is to be decided considering the maintenance aspects.
- Supply and E&C of lighting system as mentioned in TCC.
- Contractor shall carry out route survey for locating the 6.6kV Cable route, 6.6kV substation location, 11/.433kV sub-stations locations, 11kV overhead transmission line, 11kV cables, LT outdoor power distribution kiosks, earthing location and road crossing etc.
- The drawings provided along with the tender are only schematic, typical and tentative. The contractor shall prepare final detailed drawings in consultation with site engineers after carrying out the route survey for distribution. These drawings shall be prepared in accordance with IE-Rules and have to be approved by the electrical statutory authorities. Obtaining approval from statutory authority shall be the responsibility of the contractor and any expenditure involved in getting approval from statutory authority for the drawings and documents generated by the contractor shall be borne by the contractor. Based on the detailed drawings, contractor shall procure/ fabricate, install all construction power supply equipment as required and erect as per drawing. After CEA if any modification/correction is required in line with applicable IE standards the same has to be done by vendor.
- The work shall be done as per the final layout decided in consultation with BHEL Engineer at site which may vary with proposed drawings as above. This shall be done without any additional financial implication on BHEL.
- Contractor shall provide Materials, Equipment, and Devices etc. as per finally approved documents. These should be of reputed make and the equipment/ components shall conform to BIS specification and IE rules.

- Contractor shall perform Erection, Testing & Commissioning Including Obtaining Approval of entire installation from appropriate statutory authority. Contractor shall bear all the statutory fees/ levies/ charges and all other expenses in connection with the approval of installations.
- Construction of Entire System shall also include cutting/ trimming of branches of trees or clearing of any other obstruction that may come in the way of overhead line, however this must be done with the approval of NTPC / BHEL.
- Contractor shall provide the services of Operation & Maintenance of entire system to ensure reliable availability of the system and shall attend to the break downs and replace the defective components promptly. Failing which BHEL will get the same done at the risk and cost of the contractor.
- **Agency should quote for complete Package – A & Package - B. Incomplete bid shall not be acceptable.**

**2.2 Package - A**

2.2.1 FOR CONTRACTOR SUPPLIED ITEMS:

The scope of work covers identification of items at stores/ yards, checking, reporting the damages if any, supply, taking delivery at storage yard / stores, loading, transportation, unloading at Contractor's stores/ working yard, keeping in safe custody in contractor's stores, pre-assembly, calibration, checking, erection, testing and commissioning, & post-commissioning activities along with the supply of all consumables, tools and tackles, testing instruments, supply of consumables like electrodes, gas, cable dressing materials, HT/ LT insulation tapes, tag plates, PVC sleeves for wire marking, lugs, fasteners, paints and its consumables. Deployment of skilled/ unskilled manpower, engineers / supervisors, Tools & Plants (T&P), Material handling equipment, testing instruments, returning of un-used materials / items to BHEL stores. The installation and commissioning of all the electrical equipment/ items shall conform to the technical requirements specified elsewhere in the tender.

2.2.2 FOR BHEL SUPPLIED ITEMS:

The scope of work covers identification of items at stores/ yards, checking, reporting the damages if any, ~~supply,~~ taking delivery at storage yard/ stores, loading, transportation, unloading at Contractor's stores/ working yard, keeping in safe custody in contractor's stores, pre-assembly, calibration, checking, erection, testing and commissioning, & post-commissioning activities along with the supply of all consumables, tools and tackles, testing instruments, supply of consumables like electrodes, gas, cable dressing materials, HT/ LT insulation tapes, tag plates, PVC sleeves for wire marking, lugs, fasteners, paints and its consumables. Deployment of skilled/ unskilled manpower, engineers / supervisors, Tools & Plants (T & P), Material handling equipment, testing instruments, returning of un-used materials / items to BHEL stores. The installation and commissioning of all the electrical equipment/ items shall conform to the technical requirements specified elsewhere in the tender.

2.2.3 The scope of Package-A also includes Operation and maintenance of construction power distribution system till commencement of contract period of Package-B.

**2.3 Package B**

2.3.1 Deployment of minimum 2 (Two) Electricians & minimum 2 (two) Helpers with required T&Ps per shift for three shifts per day and 1 (One) Supervisor for day shift for the works of operation and maintenance of construction power distribution system which consists of all the components and equipment erected and commissioned under package A. **The man power should be available throughout the year inclusive of all holidays and Sundays.**

2.3.2 Operation & maintenance of High Masts, LT Electrical works in Offices, Stores, etc. erected and commissioned by other agencies will be part of this package **(The spares like fuses, bulbs etc. will be supplied by BHEL free of cost.)**

2.3.3 The scope of O&M work includes identification of items at stores / yards, checking, reporting the damages if any, taking delivery at storage yard / stores, loading, transportation to working yard, pre-assembly, calibration, checking, replacing, testing and commissioning, & post-commissioning activities using their tools and tackles and testing instruments along with the supply of all consumables like insulation tapes, HT tapes, electrodes, gas, paints, cable dressing materials, tag plates, PVC sleeves etc.

2.3.4 All necessary Hand tools, multi-meter, Megger, earth tester, earthing rods etc. shall be in the contractor's scope.

2.3.5 Fire extinguishers will be supplied and maintained by the contractor till the of end O&M period.

2.3.6 Contractor shall maintain adequate inventory of spares and consumables at site for regular, preventive and break down maintenance and day-to-day upkeep of the substations.

2.3.7 During the maintenance period, if the contractor fails to deploy adequate manpower continuously for two weeks, BHEL shall engage a maintenance agency at the risk and cost to contractor. All the tools and plants required for preventive maintenance and breakdown maintenance shall be arranged by the contractor.

2.3.8 During the maintenance period, Contractor shall also replace any defective items from spares at free of cost for all electrical installation. The replacement materials / spares for the items supplied by the contractor shall be replaced by the contractor free of cost. The replacement materials / spares for the items supplied by BHEL shall be supplied by BHEL as free issue.

2.3.9 In case of non-availability due to breakdowns/ failures attributable to the contractor, he shall restore it within the shortest possible time. BHEL will allow a maximum outage of 24 hours in one calendar month per substation for preventive cum breakdown maintenance. Preventive maintenance shall be scheduled with prior consent of BHEL site in charge. No recoveries will be made from the agreed monthly hire charges for such purpose up to the duration of 24 hours per month per substation.

2.3.10 In case the breakdown/ non-availability duration extends beyond 24 hours in a calendar month per substation, recoveries shall be made at the rate of 2 times the pro-rata hourly rate for each Sub- station. The weightage of individual

substation of 11/433kV and 6.6/11kV substation shall be 1:3. The pro rata hourly rate shall be calculated as under:

**PRO-RATA HOURLY RATE = AGREED MONTHLY O&M CHARGES OF INDIVIDUAL SUBSTATION DIVIDED BY 720**

2.3.11 Any other special tools & tackles required to maintain the System shall be arranged by the contractor.

**2.4 SCOPE OF WORK IN GENERAL**

2.4.1 It is not the intent to specify herein all details of materials. Any item related to this work not covered, but necessary to complete the system will be deemed to have been included in the scope of the work.

2.4.2 Deployment of skilled/ unskilled manpower, engineers/ supervisors, Tools & Plants (T&P), Material handling equipment, testing instruments, returning of un-used materials/ items to BHEL stores. The installation and commissioning of all the electrical equipment / items shall conform to the technical requirements specified elsewhere in the tender.

2.4.3 If any item or equipment not covered in this tender but requires erecting / commissioning, the same shall be carried out by the contractor. Equivalent unit rate for those item or equipment shall be considered wherever possible from the BOQ / rate schedule.

2.4.4 Supply of consumables is the scope of the contractor.

2.4.5 Supply, Fabrication and installation of steel supports wherever required is included in this scope.

2.4.6 Supply of paints and painting of items covered in the scope of works.

**2.5 HT ELECTRICAL LICENCE**

**Contractor should possess valid "HT Electrical Contractor Licence" issued by ORISSA STATE Electricity authorities for executing 11kV electrical works before start of work. Copy of the certificate shall be furnished to BHEL site engineer before the start of work.**

**2.6 OTHER TECHNICAL REQUIREMENT**

2.6.1 All Civil works as required for Installation of this complete system and other incidental civil works e.g. grouting of poles/ stays/ posts, foundations, substations including necessary earthwork like excavation, backfilling and formwork, provision of all requisite materials like cement, sand & grit, reinforcement steel, T&P, shuttering etc. are in scope of contractor.

2.6.2 The substation area shall be fenced as per Indian electricity rules & regulation and shall have provision of lockable door.

2.6.3 Earthing of all the sub-station equipment and overhead line shall be carried out as per IS: 3043.

**2.7 MATERIALS / CONSUMABLES TO BE ARRANGED BY THE CONTRACTOR FOR ERECTION AND COMMISSIONING AS PART OF THE SCOPE WITHIN THE QUOTED RATE / PRICE**

a) All types of welding electrodes, filler wires, Gases

b) Provision for Temporary Scaffoldings.
c) Insulation tape (HT/ LT).
d) Paints required for primer & final coating and for protective coating.
e) Solder wire (Lead) -(60/40)
f) Protocol / Calibration report sheets as per BHEL Format.
g) Panel/ JB sealing compound material (for cable entry from bottom / top of Panel).
h) Materials required for cable dressing (GI/ aluminum flats, PVC cable ties etc.).
i) PVC wire marker sleeves and Tag plates
j) Lugs of all size.
k) Anchor fasteners for fixing of frames, GI pipes & LDBs / JBs.
l) All Material/ Consumables are in the contractor's scope for efficient working of the system excluding BHEL supplied items mentioned explicitly in this contract.

## 2.8 STANDARDS

a) All equipment and materials shall be designed, manufactures and tested in accordance with the latest applicable Indian Standards (IS) except where modified and / or supplemented by this specification.
b) Equipment and materials conforming to any other standard which ensures equal or better quality may be accepted. In such case, copies of the English version of the standard adopted shall be submitted along with the bid.
c) The electrical installation shall meet the requirement of Indian Electricity Rules as amended up to dates, relevant IS codes of Practice and Indian Electricity Act. In addition, other rules or regulations applicable to the work shall be followed. In case of any discrepancy, the more restrictive rule shall be binding.
d) Fire insurance regulations
e) Regulations laid down by the Chief Electrical Inspector of State and CEA
f) Regulations laid down by the Factory Inspector of State
g) Any other regulations laid down by the authorities.
h) In case any clause of contradictory nature arises between standards and this specification, the former shall prevail.

**Note to Chapter-II:**
**Detailed BOQ with detailed specification of various equipment and items are given in the Chapter-XIX of Vol-IA. The rate schedule is the summary of BOQ i.e. consolidated list of BOQ. Contractor shall go through the detailed BOQ with respective rate schedule Id no. and specification before filling the rate in the rate schedule.**

**FOR FURTHER DETAILED SCOPE OF WORKS REFER RELEVANT CHAPTERS IN THIS BOOK**

**3.0 T&Ps and MMEs TO BE DEPLOYED BY CONTRACTOR**

3.1 The following minimum major (T&P) shall be deployed by the contractor for execution of this contract with in the quoted rate:

| S. No. | Description | Capacity | Minimum quantity |
|---|---|---|---|
| 1 | Oil filtering machine and tank | Minimum 1000 litres/hr | 01 |

3.2 For loading and transportation, all necessary T&P such as Trailers, Cranes, Winches, welding generators, slings, jacks, sleepers, rails etc., are to be arranged by the contractor.

3.3 The contractor at his cost shall arrange all cranes and truck/ tractor, trailers required for material handling purpose and also cranes required for erection.

3.4 All the tools & plants required for this scope of work are to be arranged by the contractor within the quoted rates. Necessary accessories for the tools & plants shall also be provided by the contractor.

3.5 EQUIPMENT FOR TESTING & COMMISSIONING:

The following testing equipment/ T&P shall be made available at site by contractor in sufficient number to carry out the job simultaneously in more than one area.

1) Insulation tester:
a) Motorized megger: 0 - 1000 - 2000 - 5000V, 0 - 25000 M ohms
b) Hand operated megger: 0.5 kV/1.0 kV/2.5 kV, 200 - 100 M ohm
2) Earth resistance tester: 0 to 1, 10, 100 ohms
3) Transformer oil test kit: Only if rate schedule includes oil filled transformers
4) Torque wrench
5) Voltmeter AC: 0 - 125 - 250 - 625 V
6) Ammeter AC: - 0 - 2A - 10A.
7) Wattmeter AC/DC: 0 - 125 - 250 V 0-5-10A.
8) Multimeter analogue:
a) AC: 2.5V - 2500V,
b) AC: 100 mA - 10 A, 10A- 200A
c) DC- 25.V - 2500V
d) DC- 50mA - 10A
e) Resistance - 0 - 200 M ohms
9) Multimeter – digital:
a) Voltages AC & DC - 100mv - 1000 V
b) Current 10-mA - 10A
c) Resistance - 0-20 M ohms
10) High vacuum stream line oil filter of 1000 LPH for transformer dry out.
11) Variac - 1 /3 phase - 5A, 15A 3 phase - 10A, 20A.
12) Primary injection kit - 0-5000 A.
13) Primary injection kit - 0-10000 A.
14) Secondary injection kit - 0-5A.
15) HV Test kit - 50 kV AC 400kVA.
16) Oscilloscope

17) Oil Tank for transformer oil filtration- Only if transformers are included in rate schedule
18) Vacuum cleaner.
19) Phase sequence meter - 110V - 450V - 25 to 65Hz.
20) Frequency meter - 0 - 115 - 230 - 4500 - 45 - 601/s.
21) Tong tester - 0 - 5A - 10A, 30A, 60A, 150A - 600A, 500A-1000A.
22) Tachometer etc.
23) mA Source
24) Temperature oil bath-If required
25) Oil specific gravity and PPM measuring equipment- Only if HV transformers are included in rate schedule
26) Contact resistance measurement kit
27) Micro ohm meter
28) Air blower

3.6 Equipment / T & P for Operation and Maintenance:

The following testing equipment / T&P shall be made available at site by contractor in sufficient number to carry out the job simultaneously in more than one area.

1) Insulation tester:
   a) Motorised megger - 0 - 1000 - 2000 - 5000V, 0 - 25000 M ohms
   b) Hand operated megger - 0.5 kV/1.0 kV/2.5 kV, 200 - 100 M ohm
2) Multimeter–Digital / analogue:
   a) AC -V 2.5V - 1000V
   b) AC- 100 mA - 10A, 10A- 200A
   c) DC- 25.V - 2500V,
   d) DC- 50mA - 10A
   e) Resistance - 0 - 200 M ohms
3) Vacuum cleaner, Aluminium ladder
4) Phase sequence meter - 110V - 450V - 25 to 65Hz.
5) Tong tester - 0 - 5A - 10A, 30A, 60A, 150A - 600A, 500A-1000A.
6) Air blower, earthing rods, Manila ropes for Changing of Disc insulator
7) Tool box set

3.7 ACCURACY REQUIREMENT OF TESTING INSTRUMENTS

| S. No. | INSTRUMENT / TOOL | RANGE | ACCURACY |
|---|---|---|---|
| 1 | Power Pack | 0 to 50V DC, 3A | ± 2% |
| 2 | Analog Multimeter | Voltage 2.5 to 2500V AC | ± 1.0% |
| | | Current 100 mA to 10A AC | ± 2.0% |
| | | Current 250 micro A to 1A DC | ± 1.5% |
| | | Resistance upto 100 ohms | ± 3.0% |
| | | Voltage 2.5V to 2500V DC | ± 1% |
| 3 | Digital Multimeter | Voltage 200mV to 1000 V DC | ± 1% + 1 digit |
| | | Philips Voltage 200mV to 1000 V AC | ± 1% + 1 digit |
| | | Hcl Current 200mA to 20 A AC | ± 0.8% + 1 digit |
| | | Philips Current 20 mA to 20 A AC | ± 0.8% + 1 digit |
| | | Resistance (Hcl) 2120 200* to 200M* | ± 0.5% + 1 digit |
| | | Resistance (Hcl) 2105 200* to 200M* | ± 0.25% + 1 digit |
| | | Hcl Voltage 200mA to 750 V | ± 0.8% + 1 digit |
| | | Philips Current 20 mA to 20 A DC | ± 0.5% + 1 digit |
| | | Hcl Current 200 mA to 010A AC | ± 1% + 1 digit |
| 5 | Secondary Injection Kit | Upto 5A | ± 0.5mA |
| 6 | Motor operated Megger | Upto 200 Ohms | ± 5% at Centre scale |
| 7 | Tongue tester | 0/300/600A AC | ± 5% |
| | | 0 to 300A DC | ± 5% |
| 8 | Tachometer (Hand held | 0 to 4000 rpm | ± 5% |
| 9 | Phase Sequence Meter | | N/A |
| 10 | Three Phase Variac | 15 A Capacity | N/A |
| 11 | Feeler gauges | 300 mm long and 100 mm long | ± 2 microns |
| 12 | Dial gauges | 0 to10mm | ± 0.01 mm |
| 13 | Hand operated Megger 500V / 1000V | Upto 200 M Ohms | ± 5% at Centre Scale<br>± 10% at end of Scale |
| 14 | Motorised Megger 2.5 kV | Upto 1000 M Ohms | ± 5% at Centre Scale<br>± 10% at end of Scale |
| 15 | Motorised Megger 2.5 kV | Upto 200 M Ohms | ± 5% at Centre Scale<br>± 10% at end of Scale |
| 16 | Earth Resistance tester (Megger) | 0 to 1, 10, 100 Ohms | ± 5% at Centre Scale range |
| 17 | AC tongue Tester | 0 to 300A AC | ± 3% |

| | | | |
|---|---|---|---|
| 18 | DC Tongue Tester | 0 to 300A DC | ± 5% |
| 19 | High Voltage test Kit | Upto 50 kV AC | ± 10% |
| | | Upto 70 kV DC | ± 10% |
| 20 | Tacho Generator (Mech) | 0 to 4000 rpm | ± 0.25% |
| 21 | DC Ammeter | 0 to 300 A | ± 10% |
| 22 | DC Voltmeter | 0 to 500 V | ± 10% |
| 23 | Micro ohm meter | 10V and 100 V | |
| 24 | Primary Injection Kit | 0-10000A | |
| 25 | Single Phase Variac | 0-15 Amps | |
| 26 | Motor direction tester | | |
| 27 | DC Tong Tester (mA) | 0-500 mA | |
| 28 | Contact resistance tester for breaker contact resistance measurement | | |
| 29 | Motorised Megger 5kV | 10000 M ohms | |

3.8 **Notes for this chapter:**

3.8.1 List of T & Ps and testing equipment are for illustrative purpose only. Any other T & Ps and testing equipment required for successful completion of the scope of the contract shall also be arranged by the contractor within the quoted rates.

3.8.2 The above instruments / equipment will be sent for testing and calibration wherever from time to time and maintained by contractor as required by BHEL.

3.8.3 All testing instruments shall have calibration certificate issued by recognized / accredited agencies.

3.8.4 List of such agencies and periodicity of calibration with calibration certificate required for different instruments will be furnished to BHEL at site.

3.8.5 Contractor shall maintain calibration records as per the BHEL format and produce them whenever called for by BHEL Engineers.

3.8.6 Contractors shall arrange experienced/qualified persons for using these calibration instruments at laboratory and also at work spot.

3.8.7 Wherever frequent calibration is required, contractor shall arrange adequate number of instruments such that the work does not suffer for want of test instruments.

3.8.8 PROTECTION / HANDLING OF TOOLS AND PLANT ARRANGED BY THE CONTRACTOR

a) Equipment, vehicles, tools and plants and materials brought to site by the contractor from his resources shall have distinctive identification marks and the contractor shall intimate the description and quantity to BHEL in writing.

b) All construction materials brought by the contractor shall have prior approval regarding quality and quantity by BHEL. The contractor shall also provide without extra cost necessary enclosure containers and protective materials for proper storage of materials inside, whenever so instructed by the purchaser without any extra cost.

c) No material or equipment or tools etc. shall be taken out of the work-site without the written consent of BHEL.

d) BHEL shall not be responsible for the safety and protection of the materials of the contractor and the contractor shall make his arrangements for proper watch and ward for his materials.

**4.0 No T & P shall be supplied by BHEL**

## 5.0 TIME SCHEDULE

### 5.1 TIME SCHEDULE OF PACKAGE - A

The entire work of Package – A (Designing, Supply, Erection, Testing and Commissioning) of all electrical components including application of Final Painting, as detailed in the Tender Specification shall be completed **within 9 months** from the date of COMMENCEMENT OF CONTRACT PERIOD of Package - A.

| S. NO. | DESCRIPTION OF ACTIVITY | COMPLETION BY |
|---|---|---|
| 01 | Completion of engineering and BOQ, finalization of 11kV line route survey, location of sub-stations etc. | Within 4 Weeks from the date of Commencement of Contract Period of Package - A. |
| 02 | Procurement, Supply, Installation, Testing & Commissioning & Clearance for charging the system with approval of statutory authority. | Within 9 Months from the date of Commencement of Contract Period of Package - A. |

### 5.2 TIME SCHEDULE OF PACKAGE - B

The operation and maintenance period of the construction power distribution system & yard lighting shall be **52 months** from the date of start of commencement of Contract Period of Package – B.

### 5.3 COMMENCEMENT OF CONTRACT PERIOD OF PACKAGE - A

The date of commencement of contract period shall be the date of Letter of Award.

### 5.4 COMMENCEMENT OF CONTRACT PERIOD OF PACKAGE - B

The date of commencement of contract period shall be the date of commissioning of the 8th (eighth) substation (11kV/433V) (i.e.: Prior to this, seven substations (11kV/433V) should have been commissioned). Till that time the contractor has to operate & maintain already energised substations (07 nos) within the package- A rates. In case of discrepancy the decision of BHEL engineer is final.

### 5.5 MOBILISATION FOR ERECTION, TESTING, COMMISSIOING ETC. of Package A

The activities for erection, testing etc. shall be started as per directions of Construction manager of BHEL.

The contractor has to augment his resources in such a manner that following major milestones of erection & commissioning are achieved on specified schedules:

**Major milestones**

| Description | Milestone month for package A |
|---|---|
| Start of work **(Expected)** | One month from commencement of package-A. |
| Completion of 6.6/11 kV SS & first 04 substations of 11kV/ 433V | 7th months from commencement of package-A. |
| Completion of balance substations | 9th months from commencement of package –A. |

In order to meet above schedule in general, and any other intermediate targets set, to meet customer / project schedule requirements, contractor shall arrange & augment all necessary resources from time to time on the instructions of BHEL.

## 5.6 MOBILISATION FOR PACKAGE B

The contractor has to provide the resources from the first day of commencement of contract period of package A. However, mobilisation of manpower explicitly for Package-B shall be deployed at the commencement of Package-B.

O&M of construction power network shall be contractors scope till the completion of contract.

## 5.7 PROVISION OF PENALTY IN CASE OF SLIPPAGE OF INTERMEDIATE MILESTONES IN PACKAGE-A

In case of slippage of Two Major Intermediate Milestones, mentioned as M1 & M2 hereunder, Delay Analysis shall be carried out on achievement of each of these two Intermediate Milestones in reference to F-14.

**M1 Milestone** - Completion of 6.6/11 kV SS & first 04 substations of 11kV/ 433V

**M2 Milestone** – Completion of balance substations.

**Refer NIT Annex 12 clause 08** regarding Modalities against provision of penalty in case of slippage of Intermediate Milestones

## 5.8 TIME EXTENSION FOR PACKAGE A

BHEL at its discretion may grant extension of time schedule in case the reasons are beyond the control of the contractor. Contractor shall provide every documentary evidence to prove to the satisfaction of BHEL that the reasons for delay are not in his control.

## 5.9 TIME EXTENSION FOR PACKAGE B

BHEL may extend the contract period for Package – B as specified in the tender specification depending upon the requirement and it shall be reviewed at appropriate time. For extended period BHEL shall pay Monthly charges for the services at the following rate:

**Extension at existing terms and condition and with 90% of monthly O&M rate.**

**5.10 CLAUSE NO 2.24 OF GENERAL CONDITIONS OF CONTRACT IS AMENDED FOR PACKAGE -A AS BELOW:**

PERFORMANCE GUARANTEE FOR WORKMANSHIP FOR CONTRACTOR SUPPLIED ITEMS:

Even though the work will be carried out under the supervision of BHEL Engineers the Contractor will be responsible for the quality of the workmanship and shall guarantee the work done for a period of 12 months from the date of commissioning as certified by the BHEL Engineer, for good workmanship and shall rectify free of cost all defects due to faulty erection detected during the guarantee period. In the event of the Contractor failing to repair the defective works within the time specified by the Engineer, BHEL may proceed to undertake the repairs of such defective works at the Contractor's risk and cost, without prejudice to any other rights and recover the same from the Guarantee money.

## 6.0 FOUNDATIONS AND GROUTING

**THE SCOPE OF THE WORKS WILL COMPRISE OF BUT NOT LIMITED TO THE FOLLOWING:**

(All the works mentioned hereunder shall be carried out within the accepted rate unless otherwise specified.)

6.0.1 Foundation for all the equipment to be erected are in the scope of the contractor.

6.0.2 Cleaning of foundation surfaces, pocket holes and anchor bolt pits etc., de-watering, making them free of oil, grease, sand and other foreign materials by soda wash, water wash, compressed air or any other approved methods etc., form/shuttering work are within the scope this work.

6.0.3 The surface of foundations shall be dressed to bring the surface of the foundations to the required level and smoothness prior to placement of equipment.

6.0.4 Foundation pockets are to be cleaned thoroughly before placing the columns/ equipment. Verticality of foundation bolts to be checked along with correctness of the threads and freeness of the nuts movement. If required, cleaning of the threads to be done with proper dies.

6.0.5 The concrete foundation, surfaces shall be properly prepared by chipping, as required to bring the top of such foundation to the required level to provide the necessary roughness for bondage and to ensure enough bearing strength. All laitance and surface film shall be removed and cleaned. The required percentage contact between contact surfaces of Packer plates and foundation shall be achieved by chipping and scrapping as per BHEL Engineer's instructions.

6.0.6 For grouting of equipment; necessary cement, sand, gravels, etc. to be arranged by the contractor including the fine aggregates.

6.0.7 PROCEDURE FOR GROUTING:
Contractor has to carry out the grouting as per the work instructions for SCOPE OF ERECTION.

6.0.8 The scope of "Construction Power Supply Package" work includes engineering, procurement, identification of equipment at BHEL storage yard, technical assistance for checking and making the shortage / damage reports, taking delivery at storage yard, erecting, and carrying out statutory tests as required, commissioning and maintenance of the equipment erected till contract period using their tools and tackles and testing instruments along with the supply of all consumables.

6.0.9 The scope of specification covers the supply, installation, testing and commissioning of the erected equipment / instrument along with accessories as detailed in Bill of Quantity.

6.0.10 Site testing shall be carried out for all electrical equipment installed by the contractor to ensure proper installation and functioning in accordance with drawings specifications and manufacturer's recommendations.

6.0.11 All the work shall be carried out as per instructions of BHEL engineer. BHEL engineer's decision regarding the correctness of the work and method of working shall be final and binding on the contractor.

6.0.12 Contractor shall erect all items, equipment etc. as per sequence prescribed by BHEL at site. BHEL engineer depending upon the availability of materials at site will decide the priority of erection requirements & methodology. No claims for extra payment from the contractor will be entertained on the grounds of deviation from the usual methods of erection adopted in erection/commissioning of similar jobs.

6.0.13 During the course of erection, testing and commissioning of construction power supply work, certain rework or modification may be necessary on account of feedback from other construction sites or on account of site maintenance requirements. The contractor shall carry out such rework/ modification expeditiously and the same shall be deemed to be part of the scope of work.

## 7.0 SCOPE OF ERECTION & COMMISSIONING –DETAILED

### 7.1 SCOPE OF ROUTE SURVEY LAYOUT AND DETAILED DRAWINGS

The drawings provided along with the tender are only schematic, typical and tentative. The contractor shall prepare final detailed drawings in consultation with site engineers after carrying out the route survey for distribution. These drawings shall be prepared in accordance with IE-Rules and have to be approved by the electrical statutory authorities. Obtaining approval from statutory authority shall be the responsibility of the contractor and any expenditure involved in getting approval from statutory authority for the drawings and documents generated by the contractor shall be borne by the contractor. Based on the detailed drawings, contractor shall procure/ fabricate, install all construction power supply equipment as required and erect as per drawing. After CEA if any modification/ correction is required in line with applicable IE standards the same has to be done by vendor.

### 7.2 CONVENTIONAL TYPE SUBSTATION 6.6/11kV – 1NO

A conventional type substation of 6.6/11kV substation is to be designed, supplied, erected, commissioned, charging cleared from statutory authority as part of this scope. Scope of Contractor supply items for Conventional Type substation shall be as below:

a) Preparation of detailed drawing of 6.6/11 kV substation layout. Approval of these drawings & documents from BHEL.
b) 1Cx630sqmm HT (6.6kV) Cable from incoming feeder to 6.6/11kV substation.
c) 6.6/11kV, 5MVA Transformer – 02 Nos.
d) 6.6kV RMU Panel - 02 Nos (Two Isolators and One VCB in each).
e) 11kV RMU Panel – 02 Nos (Two Isolators and One VCB in each).
f) ACSR Dog Conductor – from 15 km supplied for Ring Main System.
g) Supply of materials and installation of Earth Pits – 18 Nos
h) Installation of Earthing materials as required for Substation
i) Supply of light fitting with poles (90W LED) – 6 Nos
j) Installation of Lighting poles, fixture and hardware- 6 sets
k) Supply & installation of danger boards – 15 nos
l) All civil works like PCC pavement, construction of foundation for Transformer and RMUs, fencing & gate and supply of required materials for civil works

including supply and installation of fencing & gate etc. as detailed in the technical conditions of Contract clauses and drawing enclosed.

m) Supply of materials and construction of Control Room (for construction power O&M).

n) Supply of auxiliary power storage system (UPS/ Battery bank – as per actual requirement of RMU panels, Transformers and NIFPS system.)

o) Obtaining approval of entire installation from appropriate statutory authority.

p) Commissioning of Substations.

q) This also includes substation yard levelling.

r) All the allied activities for installation of NIFPS (already part of this scope) is included in the E&C of this substation. Separate payment shall not be given by BHEL for integration of the NIFPS with these transformers.

## 7.3 SCOPE OF SUPPLY & ERECTION OF 5 MVA – ONAN TRANSFORMER

a) 5 MVA, 6.6/11 kV ONAN transformers will be supplied by contractor. The contractor shall make his own arrangements for loading the transformers from Stores and unloading the same at the specified location. T& P and other materials required for loading and unloading the transformers shall be arranged by the contractor. All grouting material shall be arranged by contractors.

b) Transformer shall be checked up thoroughly and if any items are found to be damaged and requires replacement, the same shall be carried out by the contractor at free of cost.

c) All testing instrument such as megger, multimeter, oil test kit, oil-filtering machine, H.V test kit shall be arranged by the contractor to carry out the checking of the transformer. Oil filtration shall be carried out by the contractor till achieving the Dielectric strength as stipulated, other tests like insulation resistance and earth resistance checks, and Dielectric strength test of oil before filling, Buchholz relay test and phase sequence test shall be carried out by the contractor. After completing all the works, full painting shall be carried out for all the transformers.

d) No separate unit rate shall be paid for the erection/ commissioning of Transformers which shall be part of 6.6/11 kV substation works.

## 7.4 DISTRIBUTION SUBSTATION –16 NOS

Package substations (12 nos.) shall be supplied by approximately of size 2800x2430x2350mm and weight of 05MT consisting 11 kV VCB, Dry/ Oil Type 500 kVA Transformer, LT Board with all protection circuits. Balance 04 Nos. oil filled transformer of 500kVA and 02 Nos. 11kV VCB shall be supplied by BHEL. 02Nos. VCB and 04 Nos. LT Distribution Boards are to be supplied by the contractor. Scope of Contractor supply items for each Substation shall be as below:

a) Preparation of detailed drawing of 11kV/433 V substation layout. Approval of these drawings & documents from BHEL.
b) Supply of materials and installation of Earth Pits – 06 Nos
c) Installation of Earthing materials as required for Substation
d) Supply of light fittings with poles (90W LED) – 04 Nos
e) Installation of Lighting poles, fixture and hardware- 04 sets
f) Supply and installation lightning poles and spikes – 2 Nos
g) Supply & installation of danger boards – 4 nos
h) All civil works like arranging Block foundation of suitable size, fencing & gate and supply of required materials for civil works, including Supply and installation of fencing & gate etc. as detailed in the technical requirement Clause.
i) Obtaining approval of entire installation from appropriate statutory authority
j) Supply & Installation of HT termination kits for 3Cx185/3Cx240 sqmm HT cable.
k) Commissioning of Substations.
l) This also includes substation yard levelling.

**7.5 SCOPE OF PACKAGE SUBSTATION (PSS)**

a) Supply of PSS will be under BHEL's scope. The contractor shall make his own arrangements for loading the PSS from Stores and unloading the same at the specified location. The contractor shall arrange necessary T&P and other materials required for loading and unloading. Necessary civil foundation including supply of materials shall be arranged by the contractor before erecting the PSS.
b) The base framed shall be aligned, levelled and grouted in position, as per approved drawings. Wherever the base channels are not available, the same shall be fabricated and painted and the same shall be carried out by the contractor at free of cost. However, required materials shall be arranged by BHEL with the approval of Site In-charge/BHEL. Base channels shall be grouted on the foundation.
c) PSS shall be checked thoroughly and before charging. After the satisfactory completion of these checks, the LT Board and 11 kV VCB shall be energized. The contractor shall arrange all instruments required for testing at his cost. Kiosk shall be checked up thoroughly and if any items are found to be damaged/ defective/ not working and requires replacement or any internal wiring to be modified, the same shall be carried out by the contractor at free of cost. However, replacement materials shall be arranged by BHEL.
d) No separate unit rate shall be paid for the erection of PSS which shall be part of shall be part 11kV/433V substation works.

## 7.6 SCOPE OF SUPPLY & ERECTION OF L.T. KIOSK (LTDB, LDB) - WHEN NOT PART OF SUBSTATION

a) LT Kiosk will be supplied by the contractor. The contractor shall make his own arrangements for loading the L.T Kiosk from Stores and unloading the same at the specified location. The contractor shall arrange necessary T&P and other materials required for loading and unloading. Necessary civil foundation including supply of materials shall be arranged by the contractor before erecting the L.T Kiosk as part of Kiosk erection.

b) If any loose items supplied along with L.T Kiosks are required to be mounted, the same shall be carried out by the contractor at free of charge.

c) Kiosk shall be checked up thoroughly and if any items are found to be damaged/ defective/ not working and requires replacement or any internal wiring to be modified, the same shall be carried out by the contractor at free of cost.

d) Erection of LT Kiosks shall cover all the works mentioned above including full painting. The base frames shall be aligned, levelled and grouted in position, as per approved drawings. Wherever the base channels are not available, the same shall be fabricated and painted by the contractor within the quoted rates. However, required steel materials shall be arranged by BHEL with the approval of Site In-charge/ BHEL. Base channels shall be grouted on the foundation.

e) Contractor shall carry out full painting for LT Kiosks.

f) LT Kiosk shall be checked thoroughly and before charging. Contractor shall carry out checking of Breaker operation, FS unit operation, Bus bar clearances, earth resistance and protection checks etc. After the satisfactory completion of these checks, the LT Kiosk shall be energized. The contractor shall arrange all instruments required for testing at his cost.

## 7.7 SCOPE OF 11 kV FEEDER POWER DISTRIBUTION SYSTEM

Ring Main Distribution System is part of the scope with approximately 5km of overhead transmission line (15km for individual phases) normally along the periphery of the Main Plant interlaced with HT underground cables below culverts, roads crossings, PSS connections, etc. Scope of supply for this Ring Main System shall include:

a) Conducting route survey

b) Preparation of distribution drawings

c) Vetting of drawings & documents by BHEL

d) ACSR DOG Conductor.

e) Supply and installation of poles, insulators, Isolators, and other accessories for complete overhead line forming the ring main system.

f) PSCC poles / RS joist poles/ 33/11 kV GI stay set: The scope of erection work shall include excavation of earth, as per drawing, grouting with concrete of

ratio 1:4:8, supply of cement, sand, metal etc. to withstand wind velocity and coping of poles etc. complete.

g) Supply and installation of HT Termination and joining kits, Glands, lugs, etc.
h) Excavation and refilling of earth.
i) Supply and installation of cable route markers.

**7.8 SCOPE OF LAYING AND TERMINATION OF H.T. AND L.T. CABLE**

Supply Scope shall be as below:

LT cables of size 3.5Cx300 sq. mm
a) LT cables of size 3.5Cx240 sq. mm
b) LT cables of size 3.5Cx35 sq. mm
c) LT cables of size 3.5Cx70 sq. mm
d) LT cables of size 3.5Cx16 sq. mm
e) LT cable of size 3Cx2.5sqmm
f) LT cable of size 5Cx2.5sqmm

7.8.1 Both supplying and laying of GI pipes shall be in the scope of contractor.

7.8.2 HT Cables shall be laid in below ground at a depth of 1000 mm and 350mm width. Before starting excavation, route survey shall be conducted in consultation with site engineers. Cable shall be laid through GI pipes as protective cover wherever road crossings are there.

7.8.3 The cables thus drawn shall be cut to size as per route length and laid. H.T Cable termination shall be carried out only by the HT cable jointer with utmost care. Cable laying and termination shall be in accordance with IS specification as listed as a part of this document. The cables shall be suitably supported so that the cable load should not cause strain to the equipment connected.

7.8.4 The transformer, suitable cable adaptor boxes shall be arranged by the contractor at free of cost and cable termination shall be carried out by using suitable cable glands etc. as required.

7.8.5 Suitable pillar box shall be installed to form ring main systems at the incomer side.

7.8.6 Underground HT cable laying from incomer feeder to substation shall be under the scope of contractor. Excavation, laying of pipes and refilling of earth shall be part of cable laying.

7.8.7 Wherever road crossings are there, cable shall be laid in suitable pipes to the depth as mentioned above. Excavation, laying of pipes and refilling of earth shall be part of cable laying.

7.8.8 No separate unit rate shall be paid for the Laying and termination of HT & LT cables which are to be laid within the sub stations and that shall be part 11 kV/433 V substation works including supply of cable glands, lugs, etc.

7.8.9 The excavated earth shall be refilled of compacted with Cable Markers at every 30m distance.

**7.9 SCOPE OF SUPPLY AND INSTALLATION OF SIGN BOARDS AND SAFETY MEASURES**

7.9.1 All required signboards, caution boards and safety boards shall be arranged and installed by the contractor in all poles and substations wherever required. Feeder description and line description shall be displayed at vital locations. Foremost importance shall be given to Safety, and the contractor shall adhere to safety instructions and ensure use of safety appliances, as required. The contractor shall provide all safety equipment to his workmen to avoid accidents. The payment for these items are included within the quoted rates.

**7.10 SCOPE OF EARTHING, LIGHTING AND LIGHTNING PROTECTION SYSTEM**

7.10.1 The scope of earthing covers earthing of all substation equipment, and providing earth pits as per IS requirement.

7.10.2 The scope of earth pits covers excavation, supply and erection of 3m long earth electrode, filling the pits with alternate layer of charcoal & salt as per IE specification, making of brick chamber with both side plastering supply and fixing of manhole cover plate with RCC slab, as per typical drawing provided by BHEL.

7.10.3 Number of earth pits for substation shall be decided considering soil resistively. However, conventional substation shall have 6 Nos pits. i.e. 2 Nos for neutral, 2 No for Body and 2 Nos for LA.

7.10.4 LIGHTING: Scope of Lighting covers supply and installation of 4 Nos lighting poles with Fixtures, control gears and Luminaries 90W LED in each Package Substation and 06 nos. 90W LED in 6.6kV/11kV Conventional substation. The pole shall be tubular type 10m long steel poles as per applicable standard. All poles shall be supplied with associated pole mounted junction Boxes, suitable galvanized MS base plate wires etc. The scope of erection work shall include all civil works including supply of cement, sand, metal etc., mounting of assembled fittings, wiring/ cabling from junction box at the bottom of pole up to the lighting fixture,

7.10.5 LIGHTNING: The scope of work of Lightning Protection system includes supply and installation of two numbers vertical air terminations and poles of 11m long with base plate. The pole shall be tubular stepped type as per applicable standard. Vertical air terminal shall be grounded with earth pits. Required civil works for lightning pole erection and grouting, grounding the air terminals and supply of grouting and grounding materials are in the scope of Contractor. The supply of above base plate is in the scope of contractors.

7.10.6 No separate unit rate shall be paid for supply installation of Earth pits, lighting fixture/poles, lightning spikes and lightning pole which are to be erected with in the sub stations.

**7.11 DETAILED SCOPE OF WORKS – YARD LIGHTING**

130 Lighting poles without lights shall be supplied by BHEL in addition to the contractor supplied items. Scope of work for these lighting poles shall be supply of lights and other accessories. E&C of the entire system.

**7.11.1 SWAGED LIGHTING POLES:**

a) Lighting poles for flood lights shall be of stepped tubular/ swaged type 11-metre-long steel poles as per applicable standard. The steel poles shall be coated with bituminous preservative paint on the inside as well as outside surface. Exposed outside surface of steel poles shall be painted with one coat of red lead oxide primer. After installation, two coats of Aluminium paint shall be applied

b) The poles shall be supplied with associated pole mounted Junction Boxes, suitable MS base with shop drilled holes or by suitable clamps for fixing of light fixtures. No cutting or drilling of galvanized structure is permitted.

c) The lighting poles shall be erected at the locations shown in the layout drawing (This drawing is in the scope of bidder). The scope of erection work shall include excavation of earth, as per drawing, grouting with concrete of ratio 1:4:8, supply of cement, sand, metal etc. to withstand wind velocity, mounting of assembled fittings, wiring/ cabling from junction box at the bottom of pole up to the lighting fixture, installation of 50mm diameter of medium thickness GI pipe for cable protection from trench to junction box for loop-in-loop-out cable. All the above required materials shall be supplied by the bidder.

d) Each lighting pole JB shall be earthed by 25 x 3mm GI Flat bonded to 25 mm diameter GI earth electrode of 3-meter length driven vertically in the ground. 14SWG GI wire shall be taken from fixture to JB including fixing of clamps.

**7.11.2 LIGHTING FIXTURES:**

a) Flood light luminaires shall be of weather proof, Aluminium cast housing, anodized aluminium mirror polished reflector, heat resistant, toughened glass cover with necessary neoprene gaskets to prevent ingress of dust, moisture and insect, porcelain lamp holder, cable gland, earthing terminals etc. The housing shall be supported on a cast iron/ aluminium base and capable of being swiveled in both horizontal and vertical directions and locked in any desired position

b) The luminaries shall be supplied with Non- integral weather proof control gear box, suitable for use with High pressure metal halide lamps 400W or equivalent.

c) Luminaires of 400W shall be of continuous trouble free operation under atmospheric conditions, without reduction in lamp life or without deterioration of materials and internal wiring. Fixtures shall be provided with outdoor type weather proof box with IP-54 or better. Applicable standards are IS: 1913, IS: 1777, IS: 4012, IS: 4013.

d) Lighting fixtures includes supply of single ended or double ended High pressure metal halide lamp, as required. The lamp shall be with quartz discharge tube and transparent/ internal coated shell, quick restrict time (of within 5 minutes) and with burning life (about 5,000 hours) in standard rating. Applicable standards are IS: 10322, IS: 9974.

**7.11.3 LIGHTING DISTRIBUTING BOARD (LDB):**

a) LDB shall be totally enclosed dust and vermin proof cubicles without louvers and suitable for outdoor application and wall/ column/ structure mounting type with sloping canopy confirming to IP 55 class

b) LDB shall be constructed from CRCA sheet. The sheet steel used shall be cold rolled and two mm thick. The construction of LDB shall ensure adequate rigidity. All components of the LDB shall be fully mounted inside the panel. LDB shall have only one operational Front. Door shall be provided to give full access to all the components. Door shall have padlocking arrangement.

c) Good quality synthetic rubber/ neoprene gaskets shall be fixed around the door. The door when closed, shall compress the gasket uniformly.

d) LDB shall be designed to prevent contact with live parts when the front door is open.

e) LDB shall be fitted with MS mounting brackets and adequate size of removable undrilled gland plate of three mm thickness.

f) LDB shall be fitted with two GI earth studs located in accessible position on the outside of the panel on opposite sides.

g) All metal parts of the panel except current carrying parts shall be bonded together electrically to the earthing stud. Phase barriers of fireproof insulating material shall be fitted in such a manner that it is not readily possible for personnel to touch the phase bus-bars.

h) LDBs shall be with one incomer 100A SFU/100A MCCB, with outgoing feeders: 3 Nos-32ATPN MCBs/ RCCBs with timer and contactors for Auto ON/OFF Street lights and three indicating lamps with fuses for indicating bus supply ON, voltmeter with selector switch and Power terminals. The numbers & type of feeders shall be as decided by BHEL. LDB shall be provided with earth stud, earth bus bar etc. designated with labels. Applicable standards are IS: 2675, IS: 4237, IS: 13947

i) The location for erection shall be decided at site, in consultation with BHEL Engineer. Any mounting arrangement like construction of foundation, fabrication and fixing of mounting supports including supply of materials like cement, sand, steel, metal etc. shall be arranged by the vendor at his cost. Fabrication materials like angle and channels will be supplied by BHEL. The scope of erection of LDB includes providing two numbers of Earth pits with three-meter depth Earth electrode and connection using 25 x 5 GI flat.

## 8.0 INSTALLATION, TESTING & COMMISSIONING IN GENERAL:

The stages of completion of various works shall be as follows:

Completion: Equipment shall be considered to be completely erected when the following activities have been completed.

- Moving of all equipment to the respective foundations.
- Fixing of anchor bolts or tack welding as required.
- Leveling and alignment of equipment.
- Assembling of all accessories such as relays, CTs, PTs, meters, instruments etc. as described in the job specification.
- Cable laying, termination with continuity check.
- Applying of finishing coat of paint.

All the equipment shall be tested at site to know their condition and to prove suitability for required performance. The site tests and acceptance tests to be performed by contractor are detailed below.

The contractor shall be responsible for satisfactorily working of complete integrated system and guaranteed performance.

### 8.0.1 SITE TESTS AND CHECKS

- All the equipment shall be tested at site to know their condition and to prove suitability for required performance.
- The test indicated in following pages shall be conducted after installation. All tools, accessories and required instruments shall have to be arranged by contractor. Any other test which is considered necessary by the manufacturer of the equipment, contractor or mentioned in commissioning manual has to be conducted at site.
- In addition to tests on individual equipment some tests / checks are to be conducted / observed from overall system point of view. Such checks are highlighted under miscellaneous tests but these shall not be limited to as indicated and shall be finalized with consultation of client before charging of the system.
- The contractor shall be responsible for satisfactory working of complete integrated system and guaranteed performance.
- All checks and tests shall be conducted in the presence of client's representative and test results shall be submitted in six copies to client and one copy to Electrical Inspector. Test results shall be filled in proper proforma.
- After clearance from Electrical Inspector system/equipment shall be charged in step by step method.
- Based on the test results clear cut observation shall be indicated by testing engineer with regard to suitability for charging of the equipment or reasons for

not charging and this information is to be brought to the notice of the BHEL Engineer by the contractor.

**8.0.2 Trial Run Test**

After the successful test of each equipment as per standard test procedure, the entire control system shall be put on trial run test on actual site conditions and operation of the system.

**8.0.3 Acceptance Test**

The acceptance test on the system shall be carried out by the supplier as per mutually agreed test procedures to establish satisfactorily functioning of the system as a whole and each equipment as part of the system.

**8.0.4 TRANSFORMER 5MVA 6.6/11kV**

**a) Supply:**

Supply of Transformers shall be under the scope of contractor. The supplied transformer shall be checked by BHEL engineer as per approved QP, Data sheets, drawings etc. to meet the requirement before erection. The payment shall be done after checking of all supplied items as per BHEL approved documents by BHEL engineer.

**b) INSTALLATION**

To ensure that a Transformer will function satisfactorily, it is important that handling, lifting, storing and assembling are carried out with great care and cleanliness by experienced personnel who knows the various working operations very well.

**c) INSPECTION**

In connection with receiving and unloading at site, and at the final storing place before assembling, the transformers shall be inspected carefully. External visible damages as dents, paint damage etc. may imply that the transformer has been subjected to careless handling during transport and/or re-loading, and a careful investigation is therefore justified.

After the arrival of the material at receiving points, before unloading, the condition of packing and of the visible parts should be checked and possible traces of leaks verified (condenser bushing). If necessary, appropriate statements and claims should be made.

Drums containing oil which have been separately despatched should be examined carefully for leaks or any sign of tampering. All despatched drums are filled up to their capacity and any shortage should be reported.

Check immediately the gas pressure at the arrival. A positive indicates that the tank and the transformer components respectively are tight, and that the active part including the insulation materials is dry.

If there is no positive gas-pressure, transformer should be immediately filled with dry Nitrogen gas to a pressure of 0.17 kg/cm2 (2.5 psi) without loss of time.
Otherwise, it should be checked if the core isolation is satisfactory and that accessories packed separately have not been damaged during transportation.

**d) UNLOADING**

Whenever rollers/ trolleys are supplied with transformer, movement of transformer at site is carried out by mounting these rollers / trolleys.
Alternatively, for movement of transformer from loading bay to actual site of the equipment, skidding on greased rails etc. can also be resorted to.

**e) STORING**

Dismantled equipment and components are packed to the protected against normal handling and transport stresses. The instructions for lifting given on the packages must be complied with to avoid damages.
Goods stored outdoors must not be placed directly on the ground, and should be covered carefully with tarpaulin or similar materials.
Oil drum should be stored in horizontal (lying) position with both the bungs also in horizontal position.

**f) CHECK POINTS BEFORE STARTING AND DURING ERECTION**

i. Conditions of leads
ii. Bracing, clamping of leads
iii. Connections
iv. Tap changer checks
v. General conditions of insulation
vi. Core check that it has not moved in transit.
vii. Core-ground; this is checked with the megger after removing earth connection
viii. CTs, including the secondary leads and their passage through metal parts
ix. Check that shipping frame for bushings have been removed.
x. Check that coil position has not moved in transit
xi. Check for dirt, metal swarf, moisture
xii. Check that the bushing leads set without being too close to ground or other points of different potential.

**g) CHECK-POINTS DURING ERECTION:**

By means of the part list and the transformer/reactor OGA, the assembling of a fully completed transformer is carried out according to the following instructions. The following precautions are to be taken:

i. Fire-fighting equipment shall be available at the oil-treatment equipment as well as at work on and adjacent to the transformer.
ii. Welding work on or adjacent to the transformer shall be avoided, but if this is not possible, the work shall be supervised by fire-protection personnel.

iii. Smoking on or near the transformer shall not be allowed.
iv. Transformer tank, control cabinet etc., as well as assembling and oil-treatment equipment shall be connected with the permanent earthing system of the station
v. Check that there is no overpressure in the transformer when blanking plates or connection lids are to be opened.
vi. All loose objects, tools, screws, nuts etc. shall be removed from the transformer cover before opening the connection and blanking lids.
vii. All loose objects (tools, pencils, spectacles etc.) shall be removed from the boiler-suit pockets etc. before starting the work through man-holes.
viii. Tools to be used inside the transformer e.g. for tightening of screws-joint-shall be fastened to the wrist or another fixed point by means of cotton tape or string.
ix. Tools with loose sleeves and tools with catches must not be used at work inside the transformer.
x. Greatest possible cleanliness shall be observed at work inside the transformer, and at handling of part to be mounted inside the transformer.
xi. Fibrous cleaning materials should not be used as it can deteriorate oil when mixed with it.
xii. All components dispatched separately should be cleaned inside and outside before being fitted.
xiii. A Transformer is best protected for damp hazard by circulating warm, dry, de-aerated oil through it until it temperature is 5˚C to 10˚C above ambient. This should be done before allowing external excess to the interior of the tank. The warm oil should be circulated all the time transformer is open to atmosphere.
xiv. Oil pump & all joints in the oil pipe work should be air tight to avoid entrance of air through leakage joints.
xv. The active part (core and winding) should be exposed to the surrounding air for as short a time as possible. Therefore, only one blanking plate or connection lid at a time should be opened for remounting of bushing, valves etc.
xvi. Objects which-despite all precaution is dropped inside transformer / reactor, must absolutely be brought up from the equipment.
xvii. Check that the oxygen content inside the transformer tank is minimum 20% if a person is to enter the tank.

**h) ASSEMBLY**

Assembly of wheels Bushing Valves, cooling device, Oil conservator, Pilol Flanges, Blanking plates and accessories like cooling fans, pumps, OLTC and components for supervision and control oil level indicator, flow indicators, gauges, Buchholz relay, PRV, thermometers etc. are assembled according to leaflet / description valid for the components.

**i) OIL FILLING**

The following procedure is recommended.

i. Close and blank the valve to isolate the conservator from main tank. Fill the oil in

transformer under vacuum up to Buchholz level as per instructions given elsewhere.

ii. After filling the oil in transformer and breaking the vacuum, oil can be filled in the conservator either through reactor or by drain valve.

iii. Remove the inspection cover provided on the side of the conservator and check the air cell assuring that it is inflated. The air must remain in fully inflated condition during oil filling operation. If the air cell is found deflated, fit the inspection cover and inflate the air cell with dryair / nitrogen gas to 0.035 kg/sq. cm max. A gauge may be put by removing plug. After filling close these connections.

iv. Remove air release plugs provided on top of the conservator.

v. Slowly pump the oil through main reactor / drain valve. Temporarily stop filling operation when oil starts coming from opening after ensuring that no air bubbles come out through these air release holes. Fit the two air release plugs.

vi. Continue oil filling till oil start coming from air release plug stop oil after ensuring that no air bubbles come out. Fit the plug.

vii. Now release the air pressure held inside the air cell from point and continues oil filling until magnetic oil gauge indicates 35˚C level.

viii. Remove oil pump and connect air cell to breather from point. Also remove pressure gauge and put plug.

ix. The system is now properly filled. Air release plugs are fitted in normal operation.

**j) EQUIPMENT FOR OIL FILLING UNDER VACUUM**

i. High-vacuum 2 storage oil filtration plant provided with thermostat-controlled oil heaters and vacuum-proof hoses with dependent vacuum pumping system for tank evacuation. Capacity: 6 kl/hr

ii. Oil-storage tanks provided with silica-gel breathers and inlet / outlet valves for oil circulation. Recommended capacity 20kl

iii. Vacuum gauges provided in filtration plant.

iv. Equipment for measurement of electric strength (BDV) of oil - 100 kV set.

v. Equipment for moisture content of oil.

vi. Equipment for measurement of Resistivity and Tan delta at 90˚C.

vii. Transparent vacuum-proof tubes for checking of oil-level during oil filling.

viii. Valves, fitting, gaskets etc.

ix. Dry nitrogen cylinders.

**k) COMMISSIONING**

**Testing after Assembly of the Transformer**

After the transformer has been assembled at site, it shall be tested in order to check that it has not been damaged during transport and assembly to such an extent that its future operation will be at risk. Regarding the performance of the test, refer to the testing method as per standards. The results of the test shall be documented.

**COMMISSIONING CHECKS**

- Breather Silica gel (Blue when dry)
- Oil in the Breather housing cup.
- All valves for their correct opening and closing sequence.
- Oil level in conservator tank.
- Oil in cooling system.
- Oil level in bushings.
- Release air, wherever necessary.
- Cooling accessories (Pump motors, Fan motors etc.) for direction and O/L setting.
- Buchholz, oil level indicator, pressure gauges, thermometer, temperature indicators etc.
- Neutral earthing.
- Earth Resistance of Electrodes.
- Earthing of bushing test tap.
- Check oil leakage for 24 hrs.
- Check Auxiliary circuit voltage (415 V)
- Calibration of OTI / WTI with hot oil.
- Check Working of WTI / RTD repeaters at control room.
- IR of core to earth.
- Die electric strength of oil PPM & Chemical analysis, specific gravity test
- IR tests on windings to earth and between winding
- Phase sequence test & vector group check
- Continuity test
- No load voltage ratio on all tap position
- Winding resistance in all taps
- Tap changing at 415V 50 Hz supply in all three phases
- TAN-DELTA tests if quality check list calls for.
- Dew point check for N2 Gas at the time of oil filling

**INSULATION RESISTANCE TEST**

| S. No. | Description | Date | Time in Hrs | Megger (See note (3) | IR Value | Temp | Remarks |
|---|---|---|---|---|---|---|---|
| 1. | Control wiring | | | | | | |
| 2. | Tap Changer | | | | | | |
| a) | Motor | | | | | | |
| b) | Control | | | | | | |
| 3. | Cooling system | | | | | | |
| a) | Motor Fan | | | | | | |
| b) | Motor pump | | | | | | |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| c) | Control Wiring | | | | | | |
| 4. | Main Winding | | | | | | |
| a) | HV/E+LV | | | | | | |
| b) | LV/E+HV | | | | | | |
| c) | HV/IV | | | | | | |
| d) | IV/LV | | | | | | |
| e) | HV/LV | | | | | | |

**Notes: -**

- While checking these values no external, lightning arrestors etc. should be in circuit.
- Special care should always be taken while meggering the transformer winding to ensure that there is no leakage in the leads.
- Megger voltage to be decided based on the voltage rating of equipment under test.

**OIL CHARACTERISTICS**

Take necessary precaution (regarding rinsing the bottle, cleaning of hand, air bubbles etc.) while withdrawing the samples. Each sample should be free of air bubbles and should not be tested when it is hot. The sample should satisfy IS: 1866.

- Tank Top Sample Bottom Sample
- Cooling system Top Sample Bottom Sample
- OLTC Divertor (each phase)

**TESTS on CT**

- Ratio
- Polarity
- Magnetising current
- IR Value

**TESTS on PT**

- IR test of primary winding by HV megger between windings
- IR test of secondary winding by LV megger between winding and winding to earth
- Checking of voltage ratio
- Verification of terminal markings and polarity
- Checking of oil level if applicable
- Checking of continuity and IR values for cables from PT to M
- Checking tightness of earthing connection.
- Checking of insulator for cracks
- Checking output on charging of the system with connected meter

**Notes:**

- While operating the mechanism on Electrical Control, check limit switches, step by step contractor, over running device etc. once again for their actual operation and prove that they are functioning properly.
- For More details, please refer Respective Manuals.

### 8.0.5 GUIDELINES FOR ERECTION OF HT SWITCHGEAR PANELS

**a) Erection**

- The base frames will be supplied by contractor. These will have to be aligned, levelled and grouted in position as per approved drawings. Wherever the base channels are not available, the same will have to be fabricated and painted at site. Base frames shall be grouted on the openings which shall be made on the floor during the time of casting. All necessary concrete chipping and finishing works are to be completed.
- All the panels/board shall be placed on its foundation or supporting structures and shall be assembled as required. All panels should be installed with parallel, horizontal and vertical alignment by skilled craftsmen.
- All the boards will have to be delivered by contractor. Necessary interconnection of bus-bar, bolting of panels, left out panel / inter-panel wiring, etc. will have to be done after assembling the panel.

**b) The Following Points shall be Checked up During Erection**

- Layout of foundation channels.
- Floor level covered by the panel with respect to main floor level.
- Location and serial no. of panels.
- Positioning of panels.
- Verticality of switchgear panels within the limit specified.
- Freeness of Breaker Truck and modules in housing and its manual operation.
- Earthing of panels and breaker truck to station earth.
- Lugs for termination of HT and LT cables.
- Mounting and fixing arrangements of Bus bars.
- Tightening of Busbar jointing bolts as specified.
- Clearance between:
    i. Phase to Phase
    ii. Phase to earth
- Minimum clearance for:
    i. Breaker, Truck and modules withdrawal
    ii. Distance required for maintenance work
- Check the operation of:
    i. Remote control

ii. Various required - closing / tripping / alarm / indications / interlocks

- Installation position of instruments and relays and Operation of relays and meters by secondary injection.
- AC/DC supplies for panel
- Final relay settings as per customer requirements.
- Tightness of terminal connections for HT & LT connections.
- Opening operation of breaker, manually and electrically.
- Working of ammeters and voltmeters for their entire range and other panel mounted instruments like recorder, indicator etc.

**c) HT SWITCHGEAR TESTS**

- IR test
- HV one minute P.F. test checking of oil level
- Measurement of contact resistance for HT breakers
- Test to prove inter changeability of similar parts (including breaker module)
- Testing of relays as per supplier's commissioning manual
- Testing and calibration of all meters.
- Operation of all relays by secondary injection method
- Testing of CT polarities and CT ratio by primary injection test.
- Measurement of knee point voltage and secondary resistance for CTs used for differential protection.
- IR and voltage ratio test for PTs
- Functional test of all circuit components for each panel / feeder.
- Test to prove closing/tripping operation at minimum and maximum specified voltage in test and service position.
- Check for drawout test and service position of breakers for all feeders.
- Check for covering of all openings in the panel - check for continuity and operation of aux. contacts of breaker.
- HV test on vacuum interrupters (for VCBs)
- Check for pressure of SF6 gas and air (for SF6).

**8.0.6 LT SWITCHGEAR PANELS**

**a) Erection**

- The base frames will be supplied normally along with the boards or shall be fabricated at site with steel as per BOQ. These will have to be aligned, levelled and grouted in position as per approved drawings. Wherever the base channels are not available, the same will have to be fabricated and painted at site. Base frames shall be grouted on the openings which shall be made on the floor during the time of casting. All necessary concrete chipping and finishing works are to be completed within this contract.
- All the panels/board shall be placed on its foundation or supporting structures

and shall be assembled as required. All panels should be installed with parallel, horizontal and vertical alignment by skilled craftsmen

- All the boards will be delivered in sections. Necessary interconnection of bus-bar, bolting of panels, left out panel / inters panel wiring, etc. will have to be done after assembling the panel.
- Earthing Pit for the body and neutral 2 Nos each is to be made as per the drawing.

**b) Checks during erection**

- Layout of foundation channels.
- Floor level covered by the panel with respect to main floor level.
- Location and serial no. of panels.
- Positioning of panels.
- Verticality of switchgear panels within the limit specified.
- Freeness of Breaker Truck and modules in housing and its manual operation.
- Earthing of panels and breaker truck to station earth.
- Lugs for termination of LT cables.
- Mounting and fixing arrangements of Bus bars.
- Tightening of Busbar jointing bolts as specified.
- Clearance between:
    i. Phase to Phase
    ii. Phase to earth
- Minimum clearance for:
    i. Breaker, Truck and modules withdrawal
    ii. Distance required for maintenance work
- Check the operation of:
    i. Remote control
    ii. Various required - closing / tripping / alarm / indications / interlocks
- Installation position of instruments and relays and Operation of relays and meters by secondary injection.
- AC/DC supplies for panel
- Final relay settings as per customer requirements.
- Tightness of terminal connections for HT & LT connections.
- Opening operation of breaker, manually and electrically.
- Working of ammeters and voltmeters for their entire range and other panel mounted instruments like recorder, indicator etc.

**c) LT Switchgear tests**

- IR test
- Measurement of contact resistance for LT breakers
- Test to prove inter changeability of similar parts (including breaker module
- Testing of relays as per supplier's commissioning manual.
- Testing and calibration of all meters.
- Operation of all relays by secondary injection method.

- Testing of CT polarities and CT ratio by primary injection test.
- Measurement of kneepoint voltage and secondary resistance for CTs used for differential protection
- IR and voltage ratio test for PTs
- Functional test of all circuit components for each panel / feeder
- Test to prove closing / tripping operation at minimum and maximum specified voltage in test and service position
- Check for drawout test and service position of breakers for all feeders
- Check for covering of all openings in the panel - check for continuity and operation of aux. contacts of breaker.

**8.0.7 GUIDELINES FOR CABLE LAYING**

a) Also refer cable laying clause.

b) Two 6.6 kV feeders shall be given by customer. 6.6 kV ,1x630sqmm HT Cable to be laid underground from each incomer feeders to substation. Excavation, filling, all civil works for underground cabling are under contractor scope.

c) Cables laid exposed in racks/trays and routed through trenches/tunnels/basements etc. to individual drive/control devices etc. shall be taken in embedded surface exposed rigid GI conduits and or flexible conduits unless directly terminated to the equipment in the panels located, above trenches, tunnels or basement.

d) All cables routed along walls or in equipment rooms shall be protected by means of laying them through GI pipes or by providing sheet metal covers upto a height of 2000 mm from the working floor levels and platforms, for protection against mechanical damage. All vertical risers shall be of enclosed type.

e) Cable trays shall be supported on ISA 50x50x6mm MS/GI brackets. Brackets shall be welded to steel plate inserts in the trenches / tunnels or supporting channel angle / inserts in other areas.

f) Wherever cables are to be laid below roads and railway tracks, the same shall be taken through ducts buried at a suitable depth as decided by Engineers.

g) Laying and installation of power control and special cables shall generally conform to IS: 1255.

h) The cables shall be laid-out in proper direction from the cable drums (opposite to the normal direction of rotation for transportation).

i) In case of higher size cables, the laid out cables shall run over rollers placed at close intervals and finally transferred carefully on the racks/trays. Care shall be taken so that kinks and twists or any mechanical damage does not occur to cables. Only approved cable pulling grips or other devices shall be used. Under no circumstances cables shall be dragged on ground or along structure while paying out from cable drums, carrying to site and straightening for laying purpose.

j) Suitable extra length of cables shall be provided for all feeders for any future contingency, in consultation with Engineer.

k) Cable runs shall be uniformly spaced, properly supported and protected in an approved manner. All bends in runs shall be well defined and made with due

consideration to avoid sharp bending and kinking of cable. The bending radius of various types of cables shall not be less than those specified by cable manufacturers and that specified in IS: 1255.

l) All cables shall be provided with identification tags indicating the cable numbers in accordance with the cable circuit schedule. Tags shall be fixed at both ends of cables (both inside & outside of panel) both sides of floor/wall crossings, every 25m spacing for straight runs or as specified by Engineer for easy identification of cable.

m) When a cable passes through a wall, cable number tags shall be fixed on both sides of the wall.

n) Single core cables for AC Circuits shall form a complete circuit in trefoil formation supported by means of trefoil clamps of non-magnetic material.

o) Multi-core cables above 1100 V grade shall be generally laid in ladder type trays in one layer with spacing not less than one cable diameter of bigger diameter cable.

p) All 1100 V grade multicore power cables and single core DC cables shall be placed in single layer, touching each other and clamped by means of single or multiple galvanised MS saddles / aluminium strips / nylon cable ties. Cables above 35mm diameter shall be clamped individually.

q) Control cables shall be laid touching each other and wherever required may be taken in two layers. All control cables shall be clamped with a common clamp/tie.

r) Segregation of the cables on the basis of their types and their functions shall be as under for horizontal formation:

   i. HT cables shall be laid in the top tier(s)
   ii. LT power cables to be laid in the tray(s) below the HT cable trays.
   iii. LT control cables to be laid in the Tray(s) next below to the LT power cable (trays)
   iv. Special control cables including screened control cables to be laid in the bottom most tray(s).

s) For vertical formations, the trays closest to the wall shall be considered as bottom most tray and the order indicated in clause just above shall be followed. However, where there is no clear distinction of bottom / top trays, the order convenient for linking the horizontal and vertical formations shall be followed.

t) When it may not be possible to accommodate the cables as per the criteria indicated in the two clauses 17 & 18 indicated above, the following rules shall override the criteria. However, prior approval of the Engineer will be required. In hierarchical order:

   i. Control cables are mixed up with the special control cables with clear minimum gap of 100 mm between them.
   ii. LT power cables are mixed up with control cable with clear minimum gap of 150 mm between them.
   iii. LT power cables are mixed up with HT power cables with clear minimum gap of 200 mm between them.
   iv. LT power cables are mixed up with special control cables with clear minimum gap of 200 mm between them.

u) To facilitate pulling of cables in GI conduits, powdered soft stone, plastic scoop or other dry inert lubricant may be used but grease or other material harmful to the

cable sheaths shall not be used.

v) No single core cable shall pass through a GI conduit or duct except DC single core cables. AC single core cables shall pass through GT conduits/pipes in trefoil formation only.

w) In case of a 3 phase, 4 wire system, more than one single phase circuit, unless originating from the same phase shall not be taken in the same GI conduit.

x) Entry of cables from underground trenches to the buildings or tunnels shall be by some approved method. Necessary precautions shall be taken to make the entry point fully water tight by properly sealing the pipe sleeves wherever they enter directly into the building at trench level. The sealing shall be by cold setting compound. Any alternative sealing arrangement may be suggested with the offer for consideration by BHEL.

y) Wherever specific cable routes are not shown in cable schedules cables shall be laid as directed by Engineer.

z) Support spacing and clamping suitably provided and as required.

aa) Laying and installation of directly buried cables in ground shall conform to the requirements of IS: 1255.

1) SUPPORT SPACINGS & CLAMPINGS

| Trefoil Clamps: | |
|---|---|
| i. Horizontal run spacing | 1000 mm (max) |
| ii. Vertical run spacing | 1000 mm (max) |
| iii Axial spacing between adjacent trefoils | Double the diameter of larger cable or 150 mm Whichever is less |

**Other Clamps**

**A. Power Cables:**

Above 35mm OD

i) Horizontal runs: Individually clamped at 3000 mm Interval (max)

ii) Vertical runs: Individually clamped 3000mm intervals (max).

Up to 35mm OD

i) Horizontal runs: Collectively clamped at 3000 mm intervals (max)

ii) Vertical runs : Collectively clamped at 2000 mm interval (max)

**B. Control Cables:**

i) Horizontal runs: Collectively clamped at 3000 mm interval (max)

ii) Vertical runs : Collectively clamped at 3000 mm interval (max)

**C. Spacing for cables supported along structure/ceiling**

Clamping Spacing:

| | | |
|---|---|---|
| i) In horizontal runs | : | 750mm (max) |
| ii) In vertical runs | : | 750mm (max) |
| Spacing between cables | : | 30 mm (min) |

**Note:**

a. Supports shall also be provided at each bend.

b. For any change in above spacing, prior approval of Engineer will be taken

**8.0.8 CABLE TERMINATION AND JOINTING**

a) When the equipment are provided with undrilled gland plates for cable/conduit entry into the equipment, drilling and cutting on the gland plate and any minor modification work required to complete the job shall be carried out at site and drawings shall be prepared and take engineer's approval before drilling holes. Cutting shall not be allowed.

b) Termination of cables shall be done as per termination drawings & interconnection diagrams furnished to the contractor. Looping of cores/wires at terminals as shown in interconnection diagrams is to be done.

c) All cable entries in the equipment shall be sealed after glanding the cables.

d) Adequate length of cables shall be pulled inside the switch boards, control panels, terminal boxes etc. as per near termination of each core/conductor.

e) Power cable terminations shall be carried out in such a manner as to avoid strain on the terminals by providing suitable clamps near the terminals.

f) End sealing/termination of cables shall be done by means specified on the specification for terminations. The system shall be suitable for types of cable specified and complete with stress relief system.

g) Termination and jointing of aluminium / copper conductor power cables shall be done by means of compression method using compression type aluminium / tinned copper lugs.

h) Copper conductor control cables shall be terminated directly into screwed type terminals provided in the equipment. Wherever control cables are to be terminated by means of terminal lugs, the same shall be of tinned copper compression type.

i) Cable joints shall normally be made at an intermediate point in the straight run of the cable only when the length of the run is more than the standard drum length supplied by the cable manufacturer. In such cases, when jointing is unavoidable, the same shall be made by means of specified cable-jointing kit, subject to BHEL's approval of Engineer shall be taken for deciding location of joint.

j) Termination and jointing shall generally conform to the requirements of IS: 1255 and shall strictly conform to the recommendations of termination and jointing kit supplier.

**8.0.9 TESTING OF CABLES:**

a) The contractor shall submit to the Engineer a checklist for testing and commissioning and the activities shall be carried out in accordance with the checklist.

b) Testing and electrical measurement of cable installations shall conform to IS: 1255

c) Prior to installation, cables shall be tested for:

i. Continuity of conductors
ii. Insulation resistance between conductors & earth
iii. Insulation resistance between conductors.

d) After installation cables shall be tested for:

iv. Insulation resistance between conductors & iron
v. Insulation resistance between conductors & earth
vi. Conductor resistance
vii. Capacitance between conductors & earth (for cables above 7C.1.3kV grade)
viii. DC high voltage test (for LT power cables of higher sizes interconnecting PCCs& MCC)
ix. Absence of cross phasing
x. Firmness of terminations.

**8.0.10 GUIDELINES FOR ERECTION OF GI PIPES, SUPPORTS & ACCESSORIES**

a) For installation of cables in GI conduits the conduits shall be installed first without cables but having suitable pull wires laid in conduits.

b) For equipment and devices having GI conduit entry arrangement other than standard GI conduit adopter, adopters shall be provided as required to enable the GI conduit to be properly terminated, between conduit end and motor T.B.

c) GI conduits shall run without moisture or water traps and shall be made drawing arrangement towards the end.

d) The entire GI conduit system shall be firmly fastened in position. All boxes and fittings shall generally be secured independently from the GI pipes entering them.

e) Bends of GI pipes/conduits shall be made without causing damage to the pipes/conduits.

f) Occupancy of conduits shall not be greater than 40%.

g) The adopter for coupling rigid GI pipe/conduits and flexible conduit shall be of aluminium or galvanised steel.

h) Transportation and storage of cable drums shall generally conform to the requirements of IS: 1255.

i) All the cables shall be supplied to the contractor free of cost from BHEL / Customer's store / storage area. Transportation of cables from storage area to the work site shall be the responsibility of the contractor.

j) The cable drums shall be transported on wheels to the place of work.

**8.0.11 REVIEW AND MONITORING**

The detailed plan and progress of supply and installation of the system shall be made by the contractor and approved by BHEL. This shall be reviewed regularly and contractor shall take necessary action based up on the review and as per instruction of BHEL.

**8.0.12 DEFINITION OF WORK COMPLETION:**

The work under the scope of the contractor will be deemed to have been completed in all respect, only when all the activities, supplies and obligations under the scope of this Tender Specification are completed satisfactorily and so certified by the BHEL site in charge. The decision of BHEL shall be final and binding on the contractor.

**8.0.13** To meet the construction power requirement of the project, the Employer shall provide Two (02) number 6.6 kV sources through two number 220/6.9kV transformers. Bidder shall step up this power to 11kV level by providing minimum two numbers suitably rated 6.6/11.5kV transformer and associated 6.6kV RMU panel and 11kV RMU panles as perTender drawing number 4540-999-POE-F-00C. Bidder shall provide suitable 11kV O/H ring main in complete area under its scope. Bidder shall employ suitable number of 11/0.415kV Packaged Substation (PSS and associated switchgears (meeting safety requirements as per IE rules) to meet the construction power requirements at the various locations included in the bidder's scope. Suitable metering arrangement along with associated Instrument transformers and Metering Cubicles meeting the DISCOM requirements shall be provided by the bidder at supply point of Construction power, for the measurement of actual energy consumed. The charges for the energy consumed/Fix cost by the bidder (Energy Charges Only) shall be recovered by the Employer based on prevalent rate of DISCOM for 220kV drawl and type of connection used. Complete construction power arrangement along with power drawl limits shall comply with respective
DISCOM service rules. Supply, erection, testing and commissioning of overhead lines ring mains PSS, lightening arrestors, power and control cables, DC Systems etc. as required for further distribution for meeting the construction power requirements, shall be in the bidder's scope. All necessary statutory requirements for charging construction power bidder's network shall be in the bidder's scope. The bidder shall also provide power for meeting the Employer's office/miscellaneous power requirements as indicated in Employer's requirements under Clause 1.19.00. Construction power supply network, within the plant, is a temporary arrangement which shall be used during the project construction phase. Also the Employer shall not entertain any claim for exemption/reduction of liquidated damages for delay in execution of the contract due to irregular power supply. Contractor shall arrange/provide necessary backup arrangement on his own for uninterrupted power supply. The Contractor shall maintain a minimum drawl power factor as per DISCOM regulations for their substations, and all such devices for maintaining power factor shall be under the scope of contractor. All temporary wiring must comply with local regulations and will be subject to Employer's inspection and approval before connection to supply. Start-up power shall be made available by Employer at 400 KV level through evacuation lines in the switchyard for plant commissioning purpose as per work schedule for initial operation of the equipment.

**8.0.14 : Construction Water:**

Construction water shall be the responsibility of Bidder during all stages of construction. However, construction water may be provided by Owner at one point near existing Stage-II reservoir on chargeable basis. Bidder shall arrange for further distribution/transportation to required location by their own.

## 9.0 SUPPLY OF 5 MVA, 6.6/11kV TRANSFORMER

### 9.0.1 SCOPE OF WORK

The scope of work covers the design, manufacture, testing, supply, delivery at site of 5 MVA 6.6/11 kV Power Transformer fitted with off load tap changer.

It is not the intent to specify completely herein all the details of the design and construction of equipment. However, the equipment shall conform in all respects to high standards of engineering, design and workmanship and shall be capable of performing in continuous commercial operation up to the contractor's guarantee, in a manner acceptable to the purchaser, who will interpret the meanings of drawings and specification and shall have the power to reject any work or material which, in his judgment is not in accordance there with. The offered equipment shall be complete with all components necessary for their effective and trouble free operation. The Nitrogen Injection Fire Protection System is part of this scope for these transformers. This transformer shall contain all the provisions of integrating to the NIFPS.

### 9.0.2 STANDARDS

The transformers shall conform in all respects to IS-2026/1977 (with latest Amendments) / IEC 600 76 –1993 (with latest Amendments if any) except where specified otherwise. Equipment meeting any other authoritative standard which ensures an equal or better quality than the standards mentioned above will also be acceptable. In such a case, a copy of standard (English version) followed should be enclosed with the tender. Acceptability of any alternative standard is at the discretion of purchaser. The finished Power Transformer, oil, bushings, tap changer etc., that are used in manufacturing of transformer shall conform in all respects to the relevant Indian Standard Specifications / IEC Standards, with latest amendments as indicated below.

| **Indian Standard** | **Title** | **International & Internationally recognized standard** |
|---|---|---|
| IS-2026/1977 | Specification for Power transformers Part I to IV | IEC–60076–1993 Power Transformers – Part 1 to 5. IE–60071 |
| IS : 335/1993 | New insulating Oils | |
| IS-3347 and IS 2099/1986 | Porcelain Transformer Bushings & Bushings for alternating voltages above 1000Volts. | |
| IS 3639 | Specification for fittings and accessories for Power Transformer | |
| IS 6600 | Specification for loading of Power transformer | |

Equipment conforming to other internationally accepted standards, which ensure equal or higher quality than the standards mentioned above would also be acceptable. In case the Bidders who wish to offer material conforming to the other standards, salient points of difference between the standards adopted and the specific standards shall be clearly brought out in relevant schedule. Four copies of such standards with authentic English Translations shall be furnished along with the offer. In case of conflict the order of precedence shall be (i) IS (ii) IEC (iii) Other standards. In case of any difference between provisions of these standards and provisions of this specification, the provisions contained in this specification shall prevail.

### 9.0.3 PRINCIPAL PARAMETERS

#### 9.0.3.1 Design and Standardization

- The transformer and accessories shall be designed to facilitate operation, inspection, maintenance and repairs. All apparatus shall also be designed to ensure satisfactory operation under such sudden variations of the load and voltage as may be met with under working conditions on the system, including those due to short circuit.
- The design shall incorporate every reasonable precaution and provision for the safety of all those concerned in the operation and maintenance of the equipment keeping in view the requirements of Indian Electricity Rules.
- All materials used shall be of the best quality and of the class most suitable for working under the conditions specified and shall withstand the variations of temperature, and atmospheric conditions arising under working conditions without undue distortion or deterioration or the setting up of undue stresses in any part, and also without affecting the strength and suitability of various parts for the work for which they have to perform.
- Corresponding parts liable for replacement shall be interchangeable.
- Cast iron shall not be used for chambers of oil filled apparatus or for any part of the equipment which is in tension or subject to impact stresses. This clause is not intended to prohibit the use of suitable grades of cast iron for parts where service experience has shown it to be satisfactory e.g. large valve bodies, unless otherwise specified.
- All out-door apparatus, including bushing insulators with their mountings, shall be designed so as to avoid pockets in which water can collect.
- Means shall be provided for easy lubrication of all bearings and where necessary of any mechanism or moving parts that are not oil immersed.
- All mechanism where necessary shall be constructed of stainless steel, brass or gun metal to prevent sticking due to rust or corrosion.
- All taper pins used in any mechanism shall be of the split type complying with IS No. 2393 (latest version) for these items.
- All connections and contacts shall be of sample section and surface for carrying continuously the specified currents without undue heating and fixed connections shall be secured with bolts or set screws of ample size, adequately locked. Lock nuts shall be used on stud connections carrying current.

- All apparatus shall be designed to minimize the risk or accidental short circuit caused by animals, birds or vermin.

**9.0.3.2 Galvanising:**

- Galvanising shall be applied by hot-dip process or by electro galvanising process for all parts other than steel wires and shall consist of a thickness of zinc coating equivalent to not less than 610 gm zinc per square meter of surface. The zinc coating shall be smooth clean and of uniform thickness and free from defects. The preparation for galvanising and the galvanising itself shall not adversely affect the mechanical properties of the coated material. The quality will be established by tests as per IS: 2630 (latest version). (Alternatively to galvanizing, aluminising may also be considered).
- All drilling, punching, cutting, bending and welding of parts shall be completed and all burrs shall be removed before the galvanising process is applied.
- Galvanising of wires shall be applied by the hot-dip process and shall meet the requirements of the relevant IS. The zinc coating shall be smooth, clean and uniform thickness and free from defects. The preparation for galvanising and the galvanising itself shall not adversely affect the mechanical properties of wire.
- Surfaces which are in contact with oil shall not be galvanized or cadmium plated.

**9.0.3.3 Labels**

- Labels shall be provided for all apparatus such as relays, switches, fuses contained in any cubicle or marshalling kiosk.
- Descriptive labels for mounting indoors or inside cubicles and kiosks shall be of material that will ensure permanence of lettering. A matt or satin finish shall be provided to avoid dazzle from reflected light. Labels mounted on dark surface shall have white lettering on a black background. Danger notices shall have red lettering on a white back ground.
- All plates shall be of noncorrosive material.
- Labels shall be attached to panels with brass screws or with stool screws which have received rust preventive treatment or those can be stuck with araldite also.

**9.0.3.4 Bolts & Nuts**

- Steel bolts and nuts exposed to atmosphere with suitable finishes like cadmium plated or zinc plated passivity shall be used for diameters above 6 mm. If required, HT grade fasteners are to be used.
- All nuts and pins shall be locked in position with the exception of those external to the transformer. Bolts and nuts external to the transformers shall be provided with double flat washer and one spring washer.

- On out-door equipment, all bolts, nuts and washers in contact with non-ferrous parts which carry current shall be of phosphor bronze where the transfer of current is through the bolt.
- If bolts and nuts are placed so that they are in accessible by means of ordinary spanners, suitable special spanners shall be provided by the supplier.

**9.0.3.5 Cleaning & Painting**

- Before painting or filling with oil in case of Transformer, all un-galvanised parts shall be completely clean and free from rust, scale and grease and all external rough surface cavities on castings shall be filled by metal deposition.
- The interior of all transformer tanks and other oil filled chambers and internal structural steel work shall be cleaned of all scale and rust by shot-blasting or other approved method. These surfaces shall be painted with hot oil resisting epoxy paint. Minimum paint thickness shall be 40 microns.
- Except for nuts, bolts and washers, which may have to be removed for maintenance purposes, all external surfaces shall receive a minimum of three coats of paint.
- The primary coat shall be applied immediately after cleaning. The second coat shall be of oil and weather resisting nature and preferably of a shade or colour easily distinguishable from the primary and final coats shall be applied after the second coat has been touched up where necessary. The final coat shall be of glassy, oil and weather resisting non-fading paint of shade No. 631 of IS.5 primer paint shall be readymade zinc chrome as per IS-104 intermediate and final coats of paint shall be as per IS-2932.
- Nuts, bolts and washers, which may have to be removed for maintenance purposes, shall receive a minimum of one coat of paint after fixation.
- All interior surfaces of mechanism chambers and kiosks except those which have received anti-corrosion treatment shall receive three coats of paint applied to the thoroughly cleaned metal surface. The final coat shall be of a light coloured anti-condensation mixture.
- Any damage to paint work incurred during transport and erection shall be made good by the supplier by thoroughly cleaning the damaged portion and applying the full number of coats of paint that had been applied before the damage was occurred.
- The paint work shall be guaranteed for a minimum period of 5 years from the date of receipt of the equipment.
- One coat of additional paint shall be given at site by the supplier. Supplier shall supply the requisite quantity of paint.

**9.0.4 TECHNICAL REQUIREMENTS**

**9.0.4.1 Oil**

- The transformers and all associated equipment shall normally be supplied along with the fresh filled oil. The oil shall conform as per IS: 335/1993 with latest amendment and it shall be free from moisture and have uniform quality throughout. If separately

supplied in the Drums, required sufficient Qty. should be supplied. Any additional requirement of oil shall be the responsibility of Vendor / Supplier.

- To ascertain the quality of the Transformer oil, the original manufacturer's test report shall be submitted at the time of inspection. Also arrangements should be made for testing of transformer oil, after taking of the sample from the manufactured transformer and tested in the presence of BHEL's representatives or in an independent laboratory CPRI/ ERADA / NABL Accredited laboratory at the discretion of BHEL.
- Prevention of Acidity: The design and all materials and process used in the construction of the transformers shall be such as to reduce to a minimum the risk of the development of acidity in the oil. Special measures, such as nitrogen sealing or the use of inhibition oil, shall not be resorted to.

**9.0.4.2 Type of transformers and operating conditions**

- Transformers shall be oil immersed and naturally cooled core type and shall be suitable for out-door installation, and shall be provided with conservator vessels. The type of cooling shall be as stated in the relevant specifications.

**9.0.4.3 Continuous maximum rating and overloads**

- Transformers shall comply as regards to rated temperature rise and overload with the appropriate requirements of IS: 2026 when operating with ONAN cooling. Transformers shall be capable of operation continuously in accordance with IS loading guide at their C.M.R and at any ratio irrespective of the direction of flow of power and with voltage of the untapped winding maintained at the voltage stated in the ordering schedule.
- Transformers having tapping ranges extending not more than 5 percent below the nominal voltage shall operate on the principal / tapping without exceeding the limits laid down in IS-2026 for oil temperature rise and winding temperature rise as measured by resistance. On the other tapings, they shall operate continuously without injurious heating.
- Transformers except where stated below with tapping ranges extending more than 5% below the nominal voltage, shall meet the temperature rise limits specified in IS 2026 on all tapings on which the rated current is not more than 95 percent of the maximum rated current on the lowest voltage tapping. On other tapings, they shall operate continuously without injurious heating. The loading of the transformers, is to be in accordance with IS 6600: Guide for loading of oil immersed transformers.
- The transformers may be operated without danger on any particular tapping at the rated kVA provided that the voltage does not vary by more than 10% of the voltage corresponding to the tapping.
- Operation of a transformer at rated kVA at reduced voltage may give rise to excessive losses and temperature rise.

**9.0.4.4 Voltage Ratio**

- The voltage between phases on the higher and lower voltage winding of each transformer measured at no load and corresponding to the normal ratio of transformation shall be those stated in the ordering schedule. Means shall be provided for varying the normal ratio of transformation in accordance with the clause 5.35 voltage control on load type.

**9.0.4.5 Electrical Connections**

- Transformers shall be connected in accordance with the IS group symbol Dyn11.

**9.0.4.6 Frequency**

- The transformers shall be suitable for continuous operation with frequency variation of ±3% from normal 50 Hz without exceeding specified temperature rise.

**9.0.4.7 Duty under fault conditions**

- Except where modified below, it is to be assumed that the amount of generating plant simultaneously connected is such that normal voltage will be maintained on one side of any transformer when there is a short circuit between phases or phase to earth on the other side. Any transformer may be directly connected to underground cable or overhead transmission line and switched into and out of service together with its associated transmission line.
- All Transformers shall be capable of withstanding without any damage to external short circuit between phases and phase to ground according to IS: 2026 or its latest version.

**9.0.4.8 Tolerance**

| S. No. | Item | Tolerance |
|---|---|---|
| 1 | Voltage Ratio at principal tapping | The lower of the following:<br><br>±0.5% of the declared ratio<br><br>A percentage of the declared ratio equal to 1/10th of the actual % impedance voltage at rated current. |
| 2 | Impedance voltage at rated current (principal tapping) | The tolerance on percentage impedance at principal tapping and all other taps, tolerance shall be applicable as IS: 2026 |
| 3 | No load current | +30% of the declared no load current |

**9.0.4.9 Regulation and Impedance**

- The impedance voltage at normal ratio of transformation and normal rating shall be 7.15% for 5.0 MVA transformers. The tolerance shall be as per IS. The impedance value measured on any other tapping shall not exceed the value measured on the principal tapping by more than 10% impedance.

**9.0.4.10 Temperature**

- The Power Transformers shall be suitable for installation at location where ambient temperature is as indicated below and temperature rise final not to exceed the limit prescribed below:

| S. No. | Description | Temperature |
|---|---|---|
| 1 | Maximum ambient temperature | 50˚C |
| 2 | Maximum oil temperature rise by thermometer | 40˚C |
| 3 | Maximum winding temperature rise by winding resistance measurement | 50˚C |

**9.0.4.11 Flux Density**

- The maximum flux density in any part of the core and yoke, at normal ratio and at normal voltage and frequency, of each transformer shall be stated. The normal flux density for cold rolled grain oriented steel laminations shall not exceed 1.6 tesla; at normal tap position. Over fluxing should be limited to 12.5%.
- However, in case of transformers with variable flux the voltage variation which would affect flux density at every tap shall be kept in view while designing transformers.

**9.0.4.12 Vibration & Noise**

- Every care shall be taken to ensure that the design and manufacture of all transformers and auxiliary plant shall be such as to reduce noise and vibration to the level of that obtained in good modern practice. The maximum noise level should be as per NEMA standard.
- The manufacturer will ensure that the noise level shall not be more than the NEMA standard publication TR-1.

**9.0.4.13 Suppression of Harmonics**

- The transformers shall be designed with particular attention to the suppression of harmonic voltages, especially the third and fifth, so as to eliminate wave form distortion and from any possibility of high frequency disturbances, inductive effect loop circulating currents between the neutral points at different transforming stations reaching such a magnitude as to cause interference with communication circuits. For achieving this suppression of harmonics delta connected stabilizing winding should be avoided.

**9.0.4.14 Core**

- The core shall be constructed from high grade cold rolled non-ageing grain oriented silicon steel laminations, M4 or Superior Grade.
- Only prime quality CRGO sheets should be used in the transformers and no Second/ Defective/ Scrap CRGO finds way into transformers.

**9.0.4.15 Magnetic Circuit**

- The design of the magnetic circuit shall be such as to avoid static discharges, development of short circuit paths within itself of to the earthed clamping structure and the production of flux components at right angles to the planes of the laminations which may cause local heating.
- Every care shall be exercised in the selection, treatment and handling of core steel to ensure that as practicable the laminations are flat and the finally assembled core is free from distortion.
- Each lamination shall be insulated with a material that will not deteriorate due to pressure and the action of hot oil.
- Oil ducts shall be provided where necessary to ensure adequate cooling. The winding structure and major insulation shall not obstruct the free flow of oil through such ducts, where the magnetic circuit is divided into pockets by cooling ducts parallel to the plane of the laminations or by insulation material above 0.25mm thick tinned copper strip brazing pieces shall be inserted to maintain electrical continuity between pockets.
- The frame work and clamping arrangements shall be earthed.
- The class and type of insulation used on the core bolts and under the nuts and side plates shall be stated in the guaranteed technical particulars. Adequate core clamping arrangements shall be made to prevent distortion or wavy form of laminations and withstand short circuit forces. Core clamping bolts shall be effectively insulated with Kraft paper and fibre glass tubes. All the tie rods fixing the core shall be phosphated.

**9.0.4.16 Mechanical Construction of Core**

- All parts of the cores shall be of robust design capable of withstanding any shocks to which they may be subjected during lifting, transport, installation and service.
- All structural members of the assembled cores shall be of steel. All castings shall be fitted and structural steel adequately cleaned and painted before being built into the structure. Any non-magnetic or high resistance alloy used shall be of established quality.
- Adequate filaments shall be provided to enable the core and windings to be lifted.
- Suitable provision shall be made for the storage of any removable portions of the lifting tackle on the transformer tank.
- Adequate provision shall be made to prevent movement of the core and winding relative to the tank during transport and installation or while in service.

- The supporting frame work of the cores shall be so designed as to avoid the presence of pockets which would prevent complete emptying of the tank through the drain valve or cause trapping or air during filling.

**9.0.4.17 Internal Earthing Arrangement**

- GENERAL: All metal parts of the transformer with the exception of the individual core laminations, core bolts, and associated individual clamping plates shall be maintained at some fixed potential.
- EARTHING OF CORE CLAMPING STRUCTURE: The top main core clamping structure shall be connected to the tank body by a copper strip. The bottom clamping structure shall be earthed by one or more of the following methods.
- By connection through vertical tie-rods to the top structure
- By direct metal-to-metal contact with the tank base, maintained by the weight of the core winding
- By a connection to the top structure on the same side of core as the main earth connection to the tank.

**9.0.4.18 EARTHING OF MAGNETIC CIRCUIT:**

- The magnetic circuit shall be earthed to the clamping structure at one point only through a link placed in an accessible position beneath an inspection opening in the tank cover. The connection to the link shall be on the same side of the core as the main earth connection.
- Magnetic circuits having an insulated sectional construction shall be provided with a separate link for each individual section where oil ducts or insulating barriers parallel to the plane of the laminations divide the magnetic circuit into two or more electrically separate parts the ducts or barriers shall be bridged in accordance with Clause 5.13.4 and the magnetic circuit shall not be regarded as being of sectional construction.

**9.0.4.19 EARTHING OF COIL CLAMPING RINGS:** Where coil clamping rings are of metal at earth potential, each ring shall be connected to the adjacent core clamping structure on the same side of transformer as the main earth connections.

**9.0.4.20 SIZE OF EARTHING CONNECTIONS:** All earthing connections with exception of those from the individual coil clamping rings shall have cross sectional areas of not less than 0.8 sq. cm. Connections inserted between laminations may have the cross sectional area reduced to 0.2sqmm.

**9.0.4.21 Earthing Terminal**

- Two earthing terminals capable of carrying for a second, full lower voltage short circuit current of the transformer shall be provided. Provisions shall be made at positions close to each of the bottom two corners of the tank for bolting the earthing terminals to the tank structure to suit local conditions.

**9.0.5 TESTS**

- The type, acceptance and routine tests and tests during manufacture, shall be carried out on the transformer as per the provisions of IS: 2026.
- For all type and acceptance tests, the acceptance values shall be the values guaranteed by the supplier in the proforma for "Guaranteed Technical Particulars" furnished in this specification or acceptance value specified in this specification, whichever is more stringent for that particular test.

**9.0.6 Type Tests**

Type test reports of minimum 2.5MVA transformer of minimum one winding of 11kV shall be submitted for approval conducted at third party lab (NABL accredited) or witness by a third party conducted within the last 10years from the date of latest submission of bids. If type test reports are not available, then as listed below the type tests shall be performed on the transformer as specified in IS: 2026 at a third party lab (NABL accredited) or witness by BHEL's representative:

- Dielectric type tests.
- Temperature rise test. (This test shall be carried out on the tap having maximum losses).
- Short circuit.

**Note:**

- Temperature data corrected to 75˚C including ambient temperature in the test reports.

**9.0.7 Acceptance & Routine Tests**

- All acceptance and routine tests stipulated in the relevant standards shall be carried out by the supplier in presence of purchaser's representative. The purchaser reserves the right to insist for witnessing the acceptance/ routine testing of the bought out items to pass tests.
- Measurement of winding resistance.
- Measurement of ratio, polarity and phase relationship
- Measurement of impedance voltage
- Measurement of load loss
- Measurement of no load loss and no load current.
- Measurement of insulation resistance: The insulation of each winding in turn to all other windings, core, frame and tank connected together and to earth shall be measured by
- Induced over voltage withstand test.
- The separate source voltage withstand test.
- NOTE: The Bidder shall furnish details of tests carried out during the process of manufacture and inspection by the bidder to ensure the desired quality of the equipment to be supplied.

**9.0.8 Test Reports/ Certificates**

- Record of test reports shall be maintained by the Bidder at his works for periodic inspection by the purchaser's representative.
- Test certificates of tests conducted during manufacture shall be maintained by the Bidder. These shall be produced for verification as and when desired by the purchaser.

**9.0.9 Test Facilities**

- The tests shall be carried out as per relevant Standards and test certificates shall be furnished for approval. The Bidder shall indicate the details of the equipment available with him for carrying out the various tests as per relevant Standards. The bidder shall indicate the sources of all materials. He shall indicate the name of the supplier and make of meters, relays, conductor, insulating oil, electrical steel laminations constructional steel etc.
- The Meters used for conducting tests shall be calibrated periodically at reputed NABL Accredited Test Laboratories and test certificates shall be available at works for verification by purchaser's representative.
- Tests as per applicable standards should be carried out in respect of porcelain bushings, galvanization, relays and meters.
- Manufacture shall submit the calculations to confirm the thermal ability as per clause No. 9.1 of IS-2026 part –I of 1977.

**9.0.10 Test Reports on the analysis of raw materials**

- The contractor shall indicate the source of raw material and enclose test certificates and report on the analysis of electrolytic copper used for the winding and the steel used for the core, insulation materials as also bought out items from sub-suppliers.

**9.0.11 INSPECTION**

- All tests and inspection as per relevant IS shall be carried out at the place of manufacture by the manufacturer in the presence of BHEL representative. The manufacturer shall offer all reasonable facilities, without charges, to satisfy him that the material is being supplied, in accordance with this specification.
- The supplier shall give 6 working days advance intimation to enable the purchaser to depute his representative for witnessing acceptance and routine tests.
- No material shall be dispatched from its point of manufacture before it has been satisfactorily inspected and tested, unless the inspection is waived off, by the purchaser in writing.

- The acceptance of any quantity of material shall in no way relieve the Bidder of any of his responsibilities for meeting all requirements of the specification, and shall not prevent subsequent rejection if such material is later found to be defective.

**9.0.12 SPECIAL GURANTEE FOR POWER TRANSFORMER**

- The Transformer shall be guaranteed for satisfactory operation for a period of 12 months from the date of commissioning or 18 months from the date of receipt at site whichever is earlier. All similar materials/ removable parts of similar equipment shall be interchangeable with each other.

## 10.0 SUPPLY OF 15km OF 11kV ALUMINIUM CONDUCTOR STEEL REINFORCED 'DOG' CONDUCTOR:

### 10.0.1 SCOPE OF WORK:

This specification covers design, engineering, manufacturing, testing, inspection before dispatch, packing, forwarding, transportation, insurance during transit, delivery to site/ stores for Aluminium Conductor Steel Reinforced (ACSR) 'DOG' Conductor for 11kV Over Head Line Distribution system.

### 10.0.2 MATERIAL:

- The material shall be of best quality and workmanship. The stranded steel reinforced conductors shall be manufactured from hard-drawn Aluminium wires and galvanized steel wires, which have the mechanical and electrical properties specified in Technical Specification.
- The coating of the galvanized steel wires shall be applied by the hot process or electrolysis process in accordance with IS: 4826: 1968 or latest amendment thereof. The wires shall be smooth and free from all imperfections such as soils and splits.

### 10.0.3 SIZE AND PROPERTIES:

- The sizes of Aluminium Conductor Steel Reinforced 'DOG' conductors shall be as given in Technical Specification which also indicates the values of resistance and strengths etc. Aluminium size 6/4.72 mm (100 mm2 nominal Aluminium area,) 7/1.57 mm steel wire equivalent to Conductor DOG.

### 10.0.4 TOLERANCES:

The following tolerance shall be permitted:

- Tolerance on nominal diameter of aluminium wires: ±1% (one) percent.
- Tolerance on nominal diameter of galvanized steel wires: ±2% (two) percent.

### 10.0.5 MODULUS OF ELASTICITY & CO-EFFICIENT OF LINEAR EXPANSION:

The values of the final modulus of elasticity and Co-efficient of linear expansion for ACSR shall be as given hereunder:

| No. of Wires (Al./Steel) | Final Modulus of Elasticity $GN/m^2$ (Practical) | Co-efficient of linear expansion/˚C |
|---|---|---|
| ACSR 6/7 | 75 | $19.8 \times 10^{-6}$ |

### 10.0.6 JOINTS IN WIRES:

There shall be no joints of any kind in any wire of a stranded conductor containing 7 wires, except those made in base rod or wire before final drawing.

**10.0.7 STRANDING:**

- The wires used in manufacturing of stranded conductors shall satisfy all requirements of IS: 398/ 1996 (Part-I & II) before stranding. For ACSR, the lay ratio of the different layers shall be within the limit given under clause No. 2.08 below.
- In all constructions, the successive layers shall have opposite directions of lay and the outer most layers being right handed. The wires in each layer shall be evenly and closely stranded.
- In conductor having multiple layers of Aluminium wires, the lay ratio of any Aluminium layers shall be not greater than the lay ratio of the Aluminium layer immediately beneath it.

**10.0.8 LAY RATIO:**

The lay ratio (Ratio of the aerial length of a complete turn of the helix formed by an individual wire in a stranded conductor to the external diameter of the helix) shall be within the limits given below:

| **No. of Wires** | | **Lay ratio for Steel core** | | **Lay ratio for outside layer** | | **Aluminium Wire inner most layer** | |
|---|---|---|---|---|---|---|---|
| **Al.** | **Steel** | **Max.** | **Min.** | **Max.** | **Min.** | **Max.** | **Min.** |
| 6 | 7 | 28 | 13 | 14 | 10 | - | - |

**10.0.9 GROSS WEIGHT:**

- The gross weight of each wooden drum containing conductor of all sizes shall not exceed 500 kg with a tolerance limit of ±10%.
- Drums containing conductor having gross weight above 550 kg will not be accepted in any case. Also more than two lengths in one conductor drum will not be accepted.

**10.0.10 STANDARD LENGTH:**

- Standard length of ACSR DOG should be 1(one) km per Drum. Longer lengths are also acceptable provided they are within gross weight limit. The conductor supplied shall be in standard lengths of not less than 95% of the total quantity.

**10.0.11 TESTS:**

- Selection of test sample shall be done as per relevant IS.
- The conductors shall be subjected to routine and acceptance test in accordance with the relevant IS with latest amendments if any.

**10.0.12 REJECTION AND RE-TESTING**

- As per relevant IS with latest amendment if any.
- BHEL also reserves the right to check length of the conductor at Store/ Site.
- The entire cost of testing for acceptance & routine rests and checking of length etc. shall be borne by the supplier.

**10.0.13 INSPECTION:**

- BHEL reserves the right to conduct inspection of the materials being supplied by the contractor. The purchaser's representative shall be entitled to have access to the works and all places of manufacturer. The said representative shall have full facilities for un- restricted inspection of supplier's works, raw materials, manufacture of conductor and conducting necessary tests. The supplier shall keep the purchaser informed well in advance of the time of starting and process of manufacture of conductor in its various stages. The acceptance of any quantity of materials shall in no way relieve the supplier of his responsibility for meeting all requirements of the specification and shall not prevent subsequent rejection, if such materials are later found to be defective.
- Products shall be inspected at works and the test certificates shall be countersigned by Supplier's Inspecting authority/ Authorized official.

**10.0.14 PACKING & MARKING**

- The conductor shall be wound on non-returnable drum strong enough and provided within lagging of adequate strength, constructed to protect the conductor against all displacement during transit, storage and subsequent handling and stringing operation in the field. The drum shall conform to IS: 1778: 1980 as amended up to date and the dimensions shall be as per drum under column 9 of Table- 2 of the IS.
- The drum shall be suitable for wheel mounting.
- The general construction of drum shall be as shown in IS: 1778: 1980. However, the drum shall be suitable for letting off the conductor under controlled tension of the order of 300 kg minimum.
- After application of bituminized and plastic paper protective lagging or circumferential batten of minimum 50 mm thickness shall be provided suitably, in order to protect conductor from damage during transit in the event of breakage/detachment of the external protective lagging. The thickness of the external protective lagging or circumferential batten shall be sufficient to nail

across grains as far as possible to the flange edges with at least one nail per end. The length of the nails shall be not less than twice the thickness of the battens. The nails shall not protrude above general surface and shall not expose sharp edges or allow the battens to be released due to correction.

- Outside the protective lagging, there shall be minimum two binders consisting of hoop iron or galvanized steel wire. Each protective lagging shall have recesses to accommodate hoop binders.
- The conductor ends shall be properly sealed and secured with the hoop of "B" nails or bolts on the side of one of the flanges to avoid loosening of the conductor layers during transit and handling.
- A manufacturing tolerance shall be allowable limit up to -1% of total quantity.
- Each drum shall have the following information stenciled on it in indelible ink along with other essential details:
  a) Purchase Order number
  b) Name and address of the consignee
  c) Manufacturer's name or trade mark
  d) Drum number
  e) Code name and size of the conductor
  f) Length of the conductor
  g) Gross weight of the drum
  h) Weight of empty drum with protective lagging
  i) Net weight of the conductor
  j) Arrow marking for unwinding
  k) Position of the conductor end
  l) Lot number
  m) Before dispatch, property identification mark 'BHEL' shall be engraved in each drum.

**10.0.15 CONSTRUCTION OF DRUMS:**

- FLANGES:
  a) The flanges shall be of two ply construction with such ply at right angle of the other and nailed together. The nails shall be driven from the inside face of flanges, punched and then cleaned on the outer face. There shall be at least 3 nail per plank of ply with maximum nail spacing 70-75 mm.
  b) There will be a slot in the flange to receive the inner end of the conductor; the entrance shall be in line with the periphery of the barrel.
- All wooden components shall be manufactured out of seasoned soft wood free from defects that may materially weaken the component parts of the drums. Preservative treatment shall be applied to the entire drum with preservative of such a quality which is not harmful to the conductor.
- Spindle hole shall be provided at the center of the middle planks of the plies and spindle planets with 100 mm diameter holes shall be fitted on either side of both the flanges.
- DRUM AND SUPPORTS:

a) The end supports shall be securely fixed by nailing and may be disc or segmental type. The middle barrel support of the two ply construction of disc type with a 100 mm diameter concentric with the holes in flanges shall be provided at the centers of the barrel supports.

- DRUM:
  a) The wooden batons used for making the barrel of the conductor shall be segmental type. These shall be nailed to the barrel supports with at least two nails. The batons shall be closely butted and shall provide a round barrel with smooth surface. The edges of the batons shall be rounded or compared to avoid damage to the conductor.
- DRUM STUDS:
  a) Barrel studs shall be used for the construction of drum. The flanges shall be holed and the barrel supports slotted to receive them. The barrel studs shall be threaded over a length on either end sufficient to accommodate washers, spindle plates and nuts for fixing at the required spacing.
- IRON COMPONENTS:
  a) Normally, the nuts on the studs shall stand pound of the flange. All the nails used on the inner surface of the flanges and the drum barrel shall be counter sunk at least 5 mm. deep. The ends of barrel shall generally be flushed with the top of the nuts.
- PROTECTIVE ARRANGEMENT:
  a) The inner side of the flanges and drum barrel surfaces shall be painted with bitumen based paint.
  b) Before reeling, cardboard of double corrugated or thick bituminized water proof bamboo paper shall be secured to the drum barrel and inside the flanges of drum by means of suitable adhesive materials. These protective wrappings and the adhesive material used shall be of a quality which is not harmful to the conductor.
  c) After reeling the conductor, the exposed surface of the outer layer of the conductor shall be wrapped with water proof, thick, bituminized bamboo paper and also with thick plastic sheet to prevent the conductor from dirt, grit and damage during transport and handling.

**10.0.16 WEIGHTS OF ALUMINIUM AND STEEL PER KM LENGTH OF CONDUCTOR IS GIVEN BELOW:**

| | | **Weight in kg/km** | | |
|---|---|---|---|---|
| **Item No.** | **Description of materials** | **Aluminium** | **Steel** | **Total** |
| 1 | ACSR:100mm$^2$ (DOG) | 287.46 | 105.71 | 393.17 |

**10.0.17 SIZES & PROPERTIES OF ALUMINIUM CONDUCTOR STEEL REINFORCED:**

| Nominal Al. Area ($mm^2$) | Stranding and wire diameter (mm) | | Sectional Area of Al. ($mm^2$) | Total Sectional area ($mm^2$) | Approx. overall dia. (mm) | Approx. mass (kg/km) | Calculated resistance at 20˚C Max. (Ω/km) | Approx. Calculated breaking Load (kN) |
|---|---|---|---|---|---|---|---|---|
| | Al. (Nos. of wires/dia.) | Steel (Nos. of wires/dia.) | | | | | | |
| 100 | 6/4.72 | 7/1.57 | 105.00 | 118.5 | 14.15 | 394 | 0.2792 | 32.41 |

**10.0.18 SIZES & PROPERTIES OF STEEL WIRES USED IN THE CONSTRUCTION OF ALUMINIUM CONDUCTOR STEEL REINFORCED:**

| Diameter (mm) | | | Cross sectional area of nominal dia. of wire ($mm^2$) | Mass (kg/km) | Breaking Load (Min.) (in kN) | |
|---|---|---|---|---|---|---|
| Nominal | Min. | Max. | | | Before Stranding | After Stranding |
| 1.57 | 1.54 | 1.6 | 1.936 | 15.1 | 2.7 | 2.57 |

## 11.0 SUPPLY INSTALLATION AND COMMISSIONING OF NITROGEN INJECTION FIRE PROTECTION SYSTEM (NIFPS) INCLUDING CIVIL WORKS FOR 02 NOS. 5MVA, 6.6/11kV TRANSFORMERS:

### 11.0.1 SCOPE:

The scope of this specification covers Design, Engineering, Supply, testing at works before dispatch; Erection, Testing and Commissioning and performance demonstration of "fire protection and extinguishing system by nitrogen injection method". The necessary Civil Work which will be required for construction of oil soak pit for the storage of oil coming out from the transformer, plinth for extinguishing cubicle, MS Tank , laying of oil pipe, nitrogen pipe, electrical cables, control boxes, extinguishing cubicle, nitrogen cylinder, necessary valves, fire detectors and other equipment's & accessories required for erection, testing, commissioning and performance demonstration of the complete fire protection system is in the scope of the sub-contractor. Notwithstanding the technical specifications and requirements mentioned herewith any modification can be incorporated for correct operation of nitrogen injection fire protection system without extra cost. The full details of the same are required to be submitted to BHEL for approval, as and when demanded by BHEL.

### 11.0.2 General Description

This standard lays down the specification for Nitrogen Injection Explosion prevention and Fire Extinguishing System for oil cooled transformer. Dedicated Nitrogen injection system is used to:

- Prevent transformer tank explosion and possible fire, in the event of internal fault and as such it acts as fire preventer.
- Also act as firefighting system
- System comprises of Cubicle (installed near the transformer), Control Box (installed in control room), Conservator isolation valve (installed in conservator pipeline), Piping & valves for draining oil from transformer, equipment & piping for nitrogen injection, Fire detectors (on transformer top cover), Copper Cables.

### 11.0.3 Reference standards

- Central Electricity Authority, the Gazette of India, Extraordinary 2010
- Technical standards for constructions of substations and switchyards
- Technical standards for construction of Thermal Generating Stations
- Safety provisions for electrical installations and apparatus of voltage exceeding 650 volts
- CBIP Manual on Transformers-Publication No.317

**11.0.4 Principle of Operation**

Depressurization process commences through oil drain and simultaneously nitrogen is injected at a predetermined flow rate to create stirring action and to bring down temperature of top oil below ignition point, evacuates gases formed thereby preventing explosion of tank and in case of fire, it extinguishes fire within maximum 30 seconds. During fault condition, system operates and conservator isolation valve blocks oil flow to isolate conservator tank oil. Also in case of fire, it prevents escalation of fire.

The system comes in to operation automatically/ remotely/ manually under following conditions: -

a) Auto Mode

For Prevention of Fire, signals in series:

- Differential Relay Operation,
- Buchholz Relay paralleled with Pressure Relief Valve or Rapid Pressure Release Relay
- Tripping of all connected breakers (HV & LV side) is a pre-requisite for initiation of system activation.

For Extinguishing Fire, signals in series:

- Fire Detector,
- Buchholz Relay paralleled with Pressure Relief Valve or Rapid Pressure Release Relay
- Tripping of all connected breakers (HV & LV side) is a pre-requisite for initiation of system activation.

b) Manual Mode (Remote)

- Tripping of all connected breakers (HV & LV side) is a pre-requisite for initiation of system activation.

c) Manual Mode (Mechanical)

- Tripping of all connected breakers (HV & LV side) is a pre-requisite for initiation of system activation.

**11.0.5 System features**

- System shall have interlock to ensure operation of system only after transformer electrical isolation to avoid nitrogen injection in energized transformer.
- Pressure monitoring switch for back-up protection for nitrogen release as redundancy to first signal of oil draining commencement for Nitrogen release shall be provided.
- Nitrogen release scheme shall be designed in such a way that the nitrogen gas shall not enter the energized transformer tank even in case of passing/leakage of valve.
- System shall have provision of testing during commissioning, during annual maintenance and on live transformers to ensure healthiness at all times.

**11.0.6 Data Sheet**

| S. No. | Description | Specifications/Requirement |
|---|---|---|
| 1. | Type and Model<br><br>a) Type 1 | Nitrogen Injection Explosion Prevention and Extinguishing System for transformer rating<br><br>a) Up to 99 MVA |
| 2. | Details of system equipment enclosed with technical bid. | a) OGA of Fire Extinguishing Cubicle with BOM<br>b) Logic Diagram of Control box<br>c) Dimensioned Drawing of Conservator Isolation Valve<br>d) Logic Diagram of Signal Box<br>e) Technical specification of Fire Detectors/ LHD |
| 3 | Fire Extinguishing Cubicle | Split door |
| 3.1 | Dimensions (LXBXH) | Vendors to specify in mm<br>a) Type 1 |
| 3.2 | Weight | Vendors to specify in kg<br>b) Type 1 |
| 3.3.1<br><br><br>3.3.2 | Capacity and quantity of Nitrogen cylinder<br><br><br>Nitrogen gas purity | a) For Type 1 Minimum 1 No cylinder with 10 cu m gas at pressure of 150-200 kg/sq. cm<br><br>b) Nitrogen purity shall 99.99%. for NIFPES Models |
| 3.4 | Pressure of Nitrogen filling | Maximum 200 kg/sq. cm |
| 3.5 | Minimum distance of Fire Extinguishing cubicle from the transformer | 5 Meters or beside fire safety wall |
| 3.6 | Method of mounting | Plinth mounted |
| 3.7 | Items to be provided in the Fire Extinguishing cubicle | |
| 3.7.1 | Contact manometer | Will<br>a) Show nitrogen cylinder pressure<br>b) Show Falling pressure<br>c) Have Electrical contact & dual indicator for actual pressure as well as level for low pressure signal |
| 3.7.2 | Pressure Regulator with safety relief valve to increased temperature variation compensation | a) Inlet pressure: 150 -200 kg/sq. cm (+/-10%)<br><br>b) Outlet pressure range: 8 to 12 kg/sq. cm |
| 3.7.3 | Pressure gauge | For showing nitrogen injection pressure. |
| 3.7.4 | Oil Release Unit and suitable to operate without power | A) Electro mechanical type, operating on substation DC supply as well with provision for operation using manual lever in case of DC supply loss. |

| S. No. | Description | Specifications/Requirement |
|---|---|---|
| | | B) It shall have mechanical locking arrangement to ease in maintenance and avoid unnecessary operation during maintenance test. |
| 3.7.5 | Gas release unit and suitable to operate without power | a) Electro mechanical type, operating on substation DC supply as well with provision for operation using manual lever in case of DC supply loss.<br>b) It shall have mechanical locking arrangement to ease in maintenance and avoid unnecessary operation during maintenance test. |
| 3.7.6 | Oil drain assembly | Electro mechanical type, operating on substation DC supply as well with provision for operation using manual lever in case of DC supply loss. |
| 3.7.7 | Pressure monitoring switch as backup in addition to signal from limit switch to initiate nitrogen release simultaneously with oil drain commencement | Provision of Limit switch with Pressure Switch ( Back up) |
| 3.7.8 | Limit switches with No of contacts & spare contacts (NO & NC) | 1. Oil drain valve closed. 2NO<br>2. Oil drain valve open.2NO<br>3. Gas valve closed. 1NO+1NC<br>4. Gas injection started. 1NO+1NC<br>5. Oil drain unit locked mechanically.2NO/ 1NC+1NO<br>6. Nitrogen release unit locked mechanically 2NO/ 1NC+1NO |
| 3.8 | Oil drain valve (above cubicle) for system isolation from transformer | |
| 3.8.1 | Material and Type | Mild Steel, Butterfly valve |
| 3.8.2 | Size | Vendors to specify in mm<br>a) Up to 99 MVA (5MVA) |
| 3.9 | Nitrogen Injection valve (above cubicle) for system isolation from transformer | |
| 3.9.1 | Material and Type | Gun metal, Lockable, Stem rising |
| 3.9.2 | Size | 25 NB or Suitable as per Transformer |
| 3.10 | Oil drain pipe size | Vendors to specify in mm<br>a) Up to 99 MVA (5 MVA) |
| 3.10.1 | Length and Number of openings in the transformer tank | a) To be provided by Vendor as per site location, from Transformer to Fire Extinguishing cubicle & from Fire Extinguishing cubicle to oil pit/MS Tank |

| S. No. | Description | Specifications/Requirement |
|---|---|---|
| | | b) If available or Retrofitting work will be taken care as per the quoted rate separately. |
| 3.10.2 | Material | a) MS ERW, Heavy duty for Transformer to fire extinguishing cubicle<br>b) GI, Medium for fire extinguishing cubicle to oil pit |
| 3.11 | Degree of protection of Fire extinguishing Cubicle | IP 55 |
| 4 | Control Box | |
| 4.1 | Dimensions (LXBXH) | Vendors to specify in mm<br>a) Type 1 |
| 4.2 | Weight | Vendors to specify in kg<br>b) Type 1 |
| 4.3 | Type & thickness of sheet steel | CRCA, 16/14 SWG |
| 4.4 | Make of components provided in the control box | Vendor to specify make of<br>a) MCB<br>b) Relays<br>c) Hooters<br>d) Contactors<br>e) Indicating lamps<br>f) Operating switches |
| 4.5 | Control voltage | a) 110/220 V DC/ substation voltage. (The AC 230 V to DC 110V/ 220V converter/ power pack) is to be provided since DC supply is not available at Site.<br>b) AC-DC/ DC-DC converter, timer shall not be used for reliable operation |
| 4.6 | Method of mounting | Wall / Frame |
| 4.7 | Audio and visual alarms | To be provided with different volume (dB) levels |
| 4.8 | Degree of protection | IP 42 |
| 5 | Conservator Isolation Valve/ Shutter | |
| 5.1 | Type | Operating mechanically on Transformer oil flow rate with visual position indicator |
| 5.2 | Location | Horizontally in the conservator pipe line between Conservator and Buchholz relay |
| 5.3 | Conservator Pipe | Suitable for conservator pipe size 80 mm |
| 5.4 | No of contacts & spare contacts (NO & NC) | Normally Open contact shall be provided |
| 5.5 | Padlocking provision for service, filtration/ refilling / filling | To be provided |
| 5.6 | Visual position indicator similar to Buchholz relay for inspection | For physical close indication to be provided |

| S. No. | Description | Specifications/Requirement |
|---|---|---|
| 5.7 | Transformer Conservator Isolation valve setting for normal operation (Valve should not close) to ensure no obstacle for transformer breathing | 40 liter / minute for 80 mm conservator pipe |
| 5.8 | Transformer conservator Isolation valve setting for operation during abnormal flow of oil due to rupture/ explosion of tank or bushing/ oil drain during system operation | 60 liter/ minute (minimum) for 80 mm conservator pipe |
| 6 | Fire Detectors or Linear Heat Detectors (LHD) | |
| 6.1 | Type | Quartz bulb, Heat sensing / Linear Heat Detector type required - Vendor to specify type offered |
| 6.2 | Quantity Required | Depending upon Transformer top cover area – to ensure full coverage |
| 6.3 | Method of Fixing | a) Bolting on Fire Detector bracket on Transformer top cover.<br>b) using fire survival, copper cables<br>( capable to withstand 750°C) |
| 6.4 | Temperature for heat sensing (Minimum) | 140 ±2°C |
| 6.5 | Heat sensing area | 800 mm radius |
| 6.6 | Number of contacts | 2 NO |
| 6.7 | Necessity and condition of refilling/replacing | After operation |
| 7 | Power Supply | |
| 7.1 | For Control Box | a) For operation: 110/220 V DC / Substation DC voltage<br>b) For DC fail alarm: 230 V AC |
| 7.2 | For Cubicle | For illumination and heating : 230 V AC |
| 8 | Extinction period | |
| 8.1 | On commencement of Nitrogen injection | Maximum 30 seconds |
| 8.2 | On system activation | Maximum 3 minutes |
| 9 | Provision to be given for | A. On line supervision of operating signals<br>B. DC supply monitoring,<br>C. Test facility (excluding CIV, FD) on live transformer,<br>D. Anti-condensation heater for Cubicle,<br>E. Manual operation in DC supply fail, |

| S. No. | Description | Specifications/Requirement |
|---|---|---|
| | | F. Separate oil drain and Nitrogen release mechanisms. |
| 10 | Details of Tank Openings/ Fittings to be provided by Vendor for items in BHEL scope after placement of Purchase Order. (Transformer OGA Drawing will be given by BHEL to Vendor) | a) For Oil drain opening location on tank wall<br>b) For Oil drain opening – size of Cast Iron Gate valve<br>c) For nitrogen injection – location of all openings on tank wall<br>d) For nitrogen injection – size of gun metal valves<br>e) Flange sizes with dummy piece (length) in conservator pipe between Buchholz relay and conservator tank for fixing of TCIV<br>f) Brackets on transformer top cover for sensing equipment – location<br>g) Brackets on transformer top cover for sensing equipment – dimensional drawing.<br>h) Spare potential free contacts for system activating signals i.e. differential relay, buchholz relay, pressure relief valve, transformer isolation (master trip relay)- type and nos. |
| 11 | **CABLING** | a) Fire survival cables, able to withstand 750 $^0$C, for connection of fire detectors (if applicable) in parallel shall be used.<br>b) Fire retardant low smoke (FRLS) copper cable 10/12Cx2.5 mm$^2$ along with accessories<br>c) Fire retardant low smoke (FRLS) copper cable 4Cx2.5 mm$^2$ along with accessories<br>Test certificates for all the above cables shall be submitted. |
| 12 | **Oil pit/ MS tank/ Fire wall** | Oil pit (civil construction)/ Fire wall/ MS tank as required by BHEL with capacity as 10 % of total oil quantity of transformer will be provided. |
| 13 | **FACTORY TEST** | Tests will be carried out on following in the supplier's workshop in presence of purchaser's representative.<br>a) Cubicle, showing oil drain and nitrogen injection |

| S. No. | Description | Specifications/Requirement |
|---|---|---|
| | | b) Operation of Conservator isolation valve<br>c) Operation of Control box<br>d) Fire Extinguishing Performance test on total system (simulation and verification of the response the complete system without actual draining of the oil and injection of the nitrogen gas). |
| 14 | **PERFORMANCE TEST** | a) Performance test of the complete system shall be carried out after complete erection at site by the supplier's representative. These tests shall include simulation and verification of the response of the complete system without actual draining of the oil and injection of the nitrogen gas. In addition to above, additional tests as required necessary shall be conducted<br>b) It shall be demonstrated at site that during cooling pump ON/ OFF the Conservator isolation valve does not trip |
| 15 | **DRAWINGS AND MANUALS** | Following is to be submitted to BHEL:<br>a) Detailed layout drawing along with the equipment drawing to be given along with techno commercial bid indicating complete bill of materials.<br>**b)** After awarding of contract, detailed dimensional drawing of the system complete bill of materials including location and size of plinth for cubicle and recommended capacity of oil soak- pit shall be submitted for purchaser's approval. **(BHEL/ NTPC Talcher approval is required).**<br>After approval 10 (ten) sets of all above drawings and 5 (five) sets of operation and maintenance instruction manual (bound) shall be submitted for purchaser's use. |
| 16 | Spares | Spare Nitrogen Cylinder, Heat Sensor for Fire detectors or LHD, set of Hose pipes and Nitrogen Gas Regulator Assembly in required quantity to be provided. |
| 17 | Guarantee terms | A. The system shall be guaranteed for satisfactory operation and against |

| S. No. | Description | Specifications/Requirement |
|---|---|---|
| | | defects in design, materials and workmanship for the contract period.<br>Bidder shall also quote separate charges towards incremental guarantee for every six months. |

***INSTRUCTIONS TO BIDDERS (ITB)-***

1. Any other accessories, which is not listed in all above clauses but may be required for satisfactory operation of the system shall be deemed to be included in scope and also such item shall be clearly bring out in the bid.
2. The Bidder is required to quote for following quantity of Type (1) requirement

**Type 1 → 02 sets for NIFPES below 99 MVA / (for 5 MVA)**

3. The above specification is issued without any prejudice to BHEL`s standard terms & Conditions. The specification doesn't absolve the Bidder from his basic responsibility of supplying a quality material to BHEL and service to nation.
4. All the test reports required by Purchaser for the equipment are to be provided in soft copy and hard copy along with the supplies.
5. Transit insurance shall be in the scope of supplier.
6. Material shall be supplied at 2x660 MW NTPC Talcher Project.
7. The following Lay out Drawing of Sub Station, Transformer GA Drawing & foundation is already part of this scope. The same shall be shared for reference of the vendor along with this tender as separate attachments.

a) 5MVA Transformer Drawing.
b) Layout of substation.
c) Transformer Foundation Details.
d) 5MVA Transformer Drawing (AutoCAD version)

8. Since Non availability of DC supply at site, for 110/220 V DC for operation of the NIFPS system provision of AC 230 V to DC 110/220 Converter (AC to DC Power Pack) shall be in the scope of vendor and arrangement shall be made in the control cabinet. The rating of the required Load/ Amps for control system shall be confirmed by vendor during drawing approval, BHEL will provide UPS for the same as per the required rating.
9. **The transformer being protected via this NIFPS is already part of this contract. The said transformer shall have all the provisions for installing the NIFPS. Any retrofitting required in both transformers towards installation of NIFPS shall be done separately by the vendor without any additional financial implication to BHEL.**
10. Preparation of all layout, scheme, control philosophy, write up, input required for electrical inspectorate (CEA) and equipment general arrangement drawings are in the scope of the vendor and shall be submitted by vendor for approval of BHEL / BHEL's Customer.
11. If required, the stage inspection may be informed to this office one week in advance.
12. Before dispatch MDCC has to be obtained by the vendor.

13. The available details of the Nozzle/ Flange / Pipe size of the Transformer shall be as per the GA drawing submitted along with tender. If any clarification required in this regard shall be resolve without failing the time.
14. NIFPS shall be installed for Two Nos. of Transformers 5MVA, 6.6/11 kV rating.
15. Test Certificate / Guarantee Certificate: Test certificate/Guarantee certificate should be submitted along with supply as per P.O.

## 12.0 TECHNICAL REQUIREMENT FOR ITEMS SUPPLIED BY THE CONTRACTOR.

### 12.0.1 GENERAL

- Equipment and material supplied shall comply with description, rating, type and size as detailed in this specification, drawings and annexures.
- Equipment and materials furnished shall be complete and operative in add details.
- All the accessories, fittings, supports, anchor bolts etc., which form part of the equipment or which are necessary for safe and satisfactory installation and operation of the equipment shall be furnished.
- All parts shall be made accurately to standard gauges so as to facilitate replacement and repair. All corresponding parts of similar equipment shall be interchangeable.
- Samples of all items shall be made available for purchaser's approval prior to supply of item to site.

### 12.0.2 FERRULES

- Ferrules shall be required for individual core of cable hence they shall be suitable for the insulated conductor diameter.
- Ferrules shall be of plastic material.
- Numbering on the ferrules shall be engraved type with contrast colour to the base. Engrave colouring shall be of durable quality to match the entire life of the plant. Engraving shall be legible from a distance of 600 mm.
- Ferrules shall be interlocking type in such a way that the interlocked ferrules take the shape of tube with complete ferrule number appearing in a straight line.

### 12.0.3 TAGS

- Cables shall be provided with cable number tags for identification.
- Cable tags shall be of durable fibre, aluminium or stainless steel sheets.
- Cable number shall be engraved type in case of aluminium or stainless steel tags, and printed type in case of fibre sheet.
- Tags shall be durable quality of size 60mm x 12mm with holes at both ends.
- Samples of tags shall be approved by BHEL Engineer before delivery.
- Tags shall be provided with non-corrosive wire of sufficient strength for taggings.

### 12.0.4 FIRE STOP CABLE SEALING SYSTEM (AS APPLICABLE)

- Fire stop cable sealing system shall have two (2) hours fire protection rating suitable for sealing both vertical & horizontal cable penetrations. The sealing compound in conjunction with mineral wool shall form effective fire seals. The sealing compound shall have special property to allow for short circuit conditions. GPG fire stop sealing compo or equivalent sealing compound shall be used.

### 12.0.5 Ring Main Unit (RMU) Panel (6.6kV and 11kV):

Ring main unit panel (RMU) shall consist the followings in each RMU panels:

- Isolators (02 Nos)
- VCB (1 No) of 630 A
- Outdoor type

- Kindly refer attached drawings SLD for RMU panel.

## 13.0 BHEL SUPPLIED ITEMS

**13.0.1** HT Cable (6.6kV – 5km and 11kV – 5km).

**13.0.2** 12 Nos. Package substations of 500kVA, 11/.433kV each.

**13.0.3** 04 Nos. of Oil filled transformers of 500kVA, 11/.433kV each.

**13.0.4** 02 Nos. Vacuum Circuit Breakers of 11kV.

**13.0.5** 130 Nos. Lighting Poles with lights.

BHEL shall not supply any other items for the entire construction power network. Any other material required for completion of the system is deemed to have been part of the contractor's scope.

| | | | |
|---|---|---|---|
| | **BOQ for CONSTRUCTION POWER** | | |
| **BOQ Ref** | **Description** | **Approx Qty** | **UoM** |
| | **Tentative Bill of Quantities for Package- A** | | |
| **1.0** | **PREPARATION OF DRAWING & OBTAINING STATUTORY APPROVAL** | | |
| 1.01 | Route survey, preparation of route drawing, Detailed SLD, Detailed 6.6/11 kV and 11kV/433V substation drawing, 6.6kV & 11kV distribution drawing, Two/Four/Six/Eight pole structure arrangement drawing , Earthing layout, sag calculation for OH line & any other document /drawing as required by Electrical inspectrate and getting approval of above from statutory authority and also includes liaison with electrical inspectrate for field inspection and obtaining clearance certificate for charging the entire system in a phased manner as per site requirement (any number of times till completion of entire scope under this contract.) | 1 | Lump sum |
| **2.00** | **SUPPLY PORTION OF BOM FOR 6.6 KV OH LINE & 6.6/11KV SUBSTATION** | | |
| 2.01 | Supply of 5MVA 6.6/11kV Transformer | 2 | Nos. |
| 2.02 | RMU Panel as mentioned in TCC | 4 | Nos. |
| 2.03 | Supply of 11m long 365kg working load pre-stressed cement concrete poles (PSCC) as per IS:1678 . | APR | Nos. |

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|---|---|---|---|
| 2.04 | Nitrogen Injection Fire Protection System for 5 MVA Transformer | 2 | lot |
| 2.02 | **Steel Structure For 6.6/11 kV Substation** | | |
| 2.02.1 | Pole ISMB -250 13 m Height for Overhead line two/four/six/eight pole steel structure at Sub Station. | APR | Nos. |
| 2.02.2 | ISMC -100 for cross beam for Overhead line two/four/six/eight pole steel structure at Sub Station. | APR | MT |
| 2.02.3 | ISMC -75 for cross beam for Overhead line two/four/six/eight pole steel structure at Sub Station. | APR | MT |
| 2.03 | Supply of 6.6kV 800 A Air Break Switch (conventional)outdoor type, double break gang operated horizontally mounted, rotating type ,complete with all accessories for assembly and operation as per IS:1818/1972 and IS:9920 (Part-I to IV)/ latest version and IS:9921 (part I to V)/ latest version. (Each set consist of all 3 Phases). | APR | Sets |
| 2.04 | Supply of 6.6kV pin insulator with GI pin as per IS:731 - 1971 IS:2486 Part-II – 1989. (Each set consist of all 3 Phases). | APR | Sets |
| 2.05 | Supply of 6.6kV disc insulator with fixing arrangements & conductor holding clamps as per IS:3188/1965 & IEC 309/1969/Latest. (Each set consist of all 3 Phases). | APR | Sets |
| 2.06 | Supply of 6.6kV GI stay (7/4.0mm) sets with Guy, Bow, Stay Rod, wire etc. as per I.E. Specifications. | APR | Nos. |

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|---|---|---|---|
| 2.07 | Supply of 6.6kV Lightning arrestor set as per ISS/IEC Spec No. IS:3070/2-1985/Latest. (Each set consist of all 3 Phases). | APR | Sets |
| 2.08 | Supply of 6.6kV HG Fuse set as per IS (Each set consist of all 3 Phases). | APR | Sets |
| 2.09 | Supply of 6.6kV 'V' Cross arms/Straight Arm with suitable back clamps including supply of necessary GI fasteners as per IE specification. | APR | Nos. |
| 2.10 | Supply of 6.6kV top fittings (I Clamp) with suitable back clamps including supply of necessary GI fasteners as per IE specification. | APR | Nos. |
| 2.11 | Supply of 2kVA 230V 1 phase sine wave UPS of reputed make with 2 nos. of exide make 150AH 12V tubuler lead acid batteries. Vendor shall specify the make for which he is quoting in the bid and shall submit relevant certificates along with supply. | 1 | Sets |
| 2.12 | Supply of 250A out door type Floor mounted Power distribution board (PDB), IP 55 protection, Double Door type, Incomer - 01 no. 250A TPN MCCB. Outgoing - 04 nos. 63A TPN MCBs, 03 nos. 40A TPN ELCBs with 30mA tripping, 02 nos. 32 A TPN MCBs withTimer & contactors for auto on/off and 3 indicating lamps with fuse for indication bus supply ON, Digital voltmeter & VSS 0-500V, suitable bus bar arrangement for phase and neutral. Sufficient space should be provided in the removable cable gland plate to accommodate 1R 3.5CX185 sq. mm. incoming cable and | 1 | No |

| | | | |
|---|---|---|---|
| | outgoing cables of different sizes. All MCCB, MCBs and ELCBs shall be of reputed make. | | |
| 2.13 | Supply of operator remote control desk/Relay control panel with chair for operating the 6.6/11kV Substation consisting of 2 nos. of 5MVA 6.6kV/11kV Transformer, 2 nos. of 11kV & 2 nos. of 11kV outdoor vacuum circuit beakers etc. This remote control desk/relay control panel shall control all operation points of SS i.e control supply on, main supply on for 6.6kV/11kV, breaker on/off, indication on/off & trip alarm annunciation window etc. The panel shall be approved by BHEL. | 1 | Set |
| 2.14 | Supply of out door type weather proof 630A capacity 11kV Pillar box IP 55 Protection as per IS with one no. Incoming and two nos. outgoing including supply of 3 nos. 3C x 240 sq.mm reputed make heat shrink type HT Termination kits. | 5 | Set |
| **3.00** | **SUPPLY PORTION 11kV OVERHEAD TRANSMISSION** | | |
| 3.01 | Supply of ACSR Dog Conductor as per TCC | 15 | Kms |
| 3.02 | Supply of 3.5Cx300 sq.mm LT Power cable | 1500 | m |
| 3.03 | Supply of 3.5Cx240sq.mm LT Power cable | 1500 | m |

| | | | |
|---|---|---|---|
| 3.04 | Supply of 3.5Cx35 sq.mm LT Power cable | 3000 | m |
| 3.05 | Supply of 3.5Cx70 sq.mm LT Power cable | 1500 | m |
| 3.06 | Supply of 3.5Cx16 sq.mm LT Power cable | 2000 | m |
| 3.08 | Supply of 9.1m long 280kg working load pre-stressed cement concrete poles (PSCC) as per IS:1678. | 280 | Nos. |
| 3.09 | Supply of 11m steel poles - ISMB 200X100 24.2 kg/m as per IS. | 44 | Nos. |
| 3.10 | Supply of 11kV 'V' Cross arms/Straight Arm with suitable back clamps including supply of necessary fasteners as per IE specification. | APR | Nos. |
| 3.11 | Supply of 11kV GI stay (7/3.15mm) sets with Guy, Bow, Stay Rod, wire etc. as per I.E. Specifications. (Each set consist of all 3 Phases). | APR | Sets |
| 3.12 | Supply of 11kV top fittings (I Clamp) with suitable back clamps including supply of necessary fasteners as per IE specification. | APR | Nos. |
| 3.13 | Supply of 11kV disc insulator with fixing & conductor and holding clamp as per IS: 3188/1965 & IEC 309/1969/Latest. (Each set consist of all 3 Phases). | APR | Sets |
| 3.14 | Supply of 11kV pin insulator with pins as per IS: 2544/1963 AMD 125 & IEC 168/1969 Latest. (Each set consist of all 3 Phases). | APR | Sets |
| 3.15 | Supply of 11kV 400A Air break switch -double break-horizontal mounting rotating type as per ISS/IEC Spec No.4710/1968-265-C/1970/Latest. | APR | Nos. |

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|---|---|---|---|
| 3.16 | Supply of 11kV Lightning arrestor set as per ISS/IEC Spec No. IS:3070/2-1985/Latest. (Each set consist of all 3 Phases). | APR | Sets |
| 3.17 | Supply of 11kV HG fuse as per ISS/IEC Spec IS: 9385/Latest. (Each set consist of all 3 Phases) | APR | Sets |
| 3.18 | Supply of 11kV DO fuse as per ISS/IEC Latest. (Each set consist of all 3 Phases) | APR | Sets |
| 3.19 | Supply of Heat shrink type HT Indoor termination kits of reputed make for 11 kV 3C x 185 sq.mm Alu. XLPE cable. | APR | Nos. |
| 3.20 | Supply of Heat shrink type HT outdoor termination kits of reputed make for 11 kV 3C x 185 sq.mm Alu. XLPE cable. | APR | Nos. |
| 3.21 | Supply of Heat shrink type HT straight through jointing kits of reputed make for 11 kV 3C x 185 sq.mm Alu. XLPE cable. | APR | Nos. |
| 3.22 | Supply of Heat shrink type HT outdoor termination kits of reputed make for 11 kV 3C x 240 sq.mm Alu. XLPE cable. | APR | Nos. |
| 3.23 | Supply of Heat shrink type HT straight through jointing kits of reputed make for 11 kV 3C x 240 sq.mm Alu. XLPE cable. | APR | Nos. |
| 3.24 | Supply of 150mm NB 4.8mm thick medium class GI pipes for make use of cable crossing where ever required such as existing culverts, trenches and road etc. | APR | m |
| 4.00 | **SUPPLY PORTION - COMMON** | | |
| 4.01 | Supply of 800A Distribution baord as per SLD | 4 | Nos. |

| | | | |
|---|---|---|---|
| 4.02 | 11kV VCB for 500kVA PSS | 2 | Nos. |
| 4.03 | Supply of Structural steel ISMB 100, ISMC 100, ISA 75, ISA 50 for structural arrangement work. | APR | MT |
| 4.04 | Supply of 65 x 10 mm GI earth flat. | APR | m |
| 4.05 | Supply of 50 x 6 mm GI earth flat. | APR | m |
| 4.06 | Supply of 25 x 5 mm GI earth flat. | APR | m |
| 4.07 | Supply of 25 x 3 mm GI earth flat. | APR | m |
| 4.08 | Supply of Required MS/GI/Nickel cadmium fasteners/anchor fasteners for erection of all supply materials and completion of entire works covered under this package (M6 to M16). | APR | kg |
| 4.09 | Supply of Double compression type brass cable glands of reputed make for 3.5C x 185 sq. mm LT cable. | APR | Nos. |
| 4.10 | Supply of Double compression type brass cable glands of reputed make for 3.5C x 95 sq. mm LT cable. | APR | Nos. |
| 4.11 | Supply of Double compression type brass cable glands of reputed make for 3.5C x 50 sq. mm LT cable. | APR | Nos. |
| 4.12 | Supply of Double compression type brass cable glands of reputed make for 3.5Cx 25 sq. mm LT cable. | APR | Nos. |
| 4.13 | Supply of Double compression type brass cable glands of reputed make for 4C x 16 sq. mm LT cable. | APR | Nos. |
| 4.14 | Supply of single compression type brass cable glands of reputed make for 3.5Cx 25 sq. mm LT cable. | APR | Nos. |

| | | | |
|---|---|---|---|
| 4.15 | Supply of single compression type brass cable glands of reputed make for 4C x 16 sq. mm LT cable. | APR | Nos. |
| **SUPPLY PORTION-AREA LIGHTING** | **SUPPLY PORTION-AREA LIGHTING** | | |
| 5.01 | Supply of 10m height 3mm thick Octagonal GI street light pole of reputed make with base plate, foundation bolts and single lighting GI arm bracket with fasteners suitable for fixing of 90W LED street light fitting. Make shall be approved by BHEL/ Engineer. | 100 | Nos. |
| 5.02 | Supply of Electrical junction box (GI/PVC)of good quality to suit the opening availabe in above lighting pole, one connector block for 3 Phase 4 wire incoming and outgoing cable to next street light pole with 01 no. 6A SP MCB for street light and earthing etc. | 100 | Nos. |
| 5.03 | Supply of 90W LED street light fitting of make Philips/CGL/Bajaj/Havells only. | 100 | Nos. |
| 5.04 | Supply of 3 core 1.5 sq. mm size copper PVC insulated flexible cable of reputed make. | 1000 | m |
| 5.05 | Supply of 50mm NB 3.6mm thick medium class GI pipe for incoming and outgoing cables. | 400 | m |
| 5.06 | Supply of 100mm NB 4.5 mm thick medium class GI pipes for make use of cable crossing where ever required such as existing culverts, trenches and road etc. | 200 | m |

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| 5.07 | Supply of outdoor type metal clad LT distribution board (LTDB) having IP -55 Protection, one incomer with 400A TPN CHANGE OVER SWITCH for EB supply & DG SET POWER SUPPLY and 2 nos. 200 A and 2 nos. outgoing feeders with 63 A TPN MCBs, 3 indicating lamps with fuse for indication bus supply ON, Voltmeter & VSS 0-500V etc. Sufficient space should be provided for the removable cable gland plate to accommodate the power cable and all outgoing cables from suitable connectors from each MCB/ELCB. Neutral link bar for incoming and outgoing neutrals. | 5 | Nos. |
| 5.08 | Supply of out door type metal clad Lighting distribution board (LDB) having IP -55 protection with double door type and one incomer with 100A TPN MCCB additionally with 3 nos. 32 A TPN MCBs and timer & contactors for auto on/off street lights and 3 indicating lamps with fuse for indication bus supply ON, Digital Voltmeter & VSS 0-500V etc. Suitable busbar arrangement for Phase and Neutral . Sufficient space should be provided in the removable cable gland plate to accommodate incoming power cable and all outgoing cables. | 5 | Nos. |
| **6.00** | **ERECTION, TESTING & COMMISSIONING PORTION OF BOM FOR 6.6kV OH LINE & 6.6kV/11KV SUBSTATION** | | |
| 6.01 | Erection of 11m long 365kg working load pre-stressed cement concrete poles (PSCC). The erection includes excavation of earth of size 1x1x1.8m depth, grouting with concrete of ratio 1:4:8 for size of 1x1x1.8m depth including | 10 | Nos. |

| | | | |
|---|---|---|---|
| | supply of cement, sand, metal etc. for the foundation and coping of poles by 1 feet height. | | |
| 6.02 | **Erection of Steel Structure For 33/11 kV Substation as per layout Drg. The erection includes excavation of earth of size 1x1x1.8m depth, fasteners, foundtation bolt, grouting with concrete of ratio 1:4:8 for size of 1x1x1.8m depth including supply of cement, sand, metal etc for the foundation and coping of poles by 1 feet height.** | | |
| 6.02.1 | Erection of Pole ISMB - 250 13m height for overhead line of Substation. | 24 | Nos. |
| 6.02.2 | Erection of ISMC -100 as cross beam for Overhead line steel structure. | APR | MT |
| 6.02.3 | Erection of ISMC -75 as cross beam for Overhead line steel structure. | APR | MT |
| 6.03 | Erection of 6.6kV Pin insulator with pins(Each set consist of all 3 Phases). | APR | Sets |
| 6.04 | Erection of 6.6kV disc insulator with fixing & conductor and holding clamp (Each set consist of all 3 Phases). | APR | Sets |
| 6.05 | Erection of 6.6kV GI stay (7/4.0.mm) sets with Guy, Bow, Stay Rod, wire etc. as per I.E. Specifications. The erection includes excavation of earth of size 0.8x0.8x1.0m depth, grouting with concrete of ratio 1:4:8 for size of 0.8x0.8x1.0m depth including supply of cement, sand, metal etc. | APR | Nos. |
| 6.06 | Erection of 6.6kV top fittings (I Clamp) with suitable back clamps including Alu. Painting as per IE specification. | APR | Nos. |
| 6.07 | Erection of 6.6kV 'V' Cross arms/Straight Arm with suitable back clamps including Alu. Painting as per IE specification. | APR | Nos. |

| | | | |
|---|---|---|---|
| 6.08 | Erection of 6.6kV 800 A Air Break Switch (conventional) outdoor type, double break gang operated horizontally mounted, rotating type, complete with all accessories for assembly and operation as per IS: 1818/1972 and IS: 9920 (Part-I to IV)/ latest version and IS: 9921 (part I to V)/ latest version. | APR | Sets |
| 6.09 | Erection of 6.6kV Lightning arrestor set as per ISS/IEC Spec No. IS: 3070/2-1985/Latest. (Each set consist of all 3 Phases). | APR | Sets |
| 6.10 | Erection of 6.6kV HG Fuse set as per IS. (Each set consist of all 3 Phases). | APR | Sets |
| 6.11 | Erection & Commissioning of 2kVA 230V 1 phase sine wave UPS of reputed make with 2 nos. of exide make 150AH 12V tubuler lead acid batteries. | 1 | Set |
| 6.12 | Erection and Commissioning of operator remote control desk/Relay control panel with chair for operating the 6.6/11kV Substation consisting of 2 nos. of 5MVA 6.6/11kV Transformer, 2 nos. of 11kV outdoor beakers etc. This remote control desk/relay control panel shall control all operation points of Substation i.e control supply on, main supply on for 6.6/11kV, breaker on/off, indication of on/ off & trip alarm annuntiation panel etc. | 1 | Set |
| - | **6.6/11kV-SUBSTATION ( Lumpsum rate to be quoted)** | - | - |

| | | | |
|---|---|---|---|
| 6.13 | 1. Supply of materials as required for erection, testing & commissioning of 2 bays 6.6/11kV substation consists of 2 nos 5MVA 6.6/11kV Transformer, 4 no. RMU Panels, Cabling, termination etc with allied works and all accessories. | 1 | Set |
| | A- Leveling of substation yard, supply and spreading of 40mm size stone aggregate of 100 mm thick for an area of size approx 40 m x 20 m, supply and construction of brick work with cement mortar 1:6 of 230 mm thick and 450 mm height all around the substation yard, plastering the brick work in CM 1:6 etc. | | |
| | B- Supply and construction of RCC foundation as per scheme drawing for 6.6kV VCBs Appx size 3.0m x 1.5m x2.6m (LXBXH) -2 nos., 6.6/11kV 5MVA Transformers -2 nos. Appx size 3.5m x 3m x4m (LXBXH) and11kV VCBs Appx size 2m x 1m x2.5m (LXBXH), from ground level and including excavation of plinth pit and base concreting and plastering, white washing etc. including construction of Fire Wall in between 02 nos. 5MVA transformer and oil soak pit as per IE stanard and as per detailed layout Drg. | | |
| | C- Supply and fixing of 3.15mm GI chain linked wire fencing height 2 m for the substation of appx size 40m x 20m . Grouting of 3m height ISA 75 fabricated posts at an interval of 1.5m (2m vertical 0.5m slanting, 0.5m grouting). Three runs of barbed wire along with the fencing on the slanting angle post, fixing of mesh with post by 50x6mm MS flat with | | |

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|---|---|---|---|
| | fasteners (2 nos./post) and earthing of fencing by 25x3 GI flat and providing finish aluminum painting of all steel materials etc. | | |
| | D- Supply and installation of 3m x 2m height double door type MS gate made of Angle, channel/rolled sections including supply and fixing of hinges, fasteners, locking arrangement etc, including providing of finish aluminum painting . | | |
| | E- Supply and Erection of 3m long 50mm dia 3.6 mm thick medium class GI funnel type earth electrode with filling of bentonite earthing powder as per standard, four side brick work chamber with cement plastering , white washing and removable type RCC/ cast iron cover plate. Scope includes supply of required bentonite earthing powder, cement, brick, sand, RCC/cast iron cover plate. Making of earth mat using 65X10 mm GI flats for main equipment body earthing & neutral earthing, 25x5 flat for LA earthing and others . Minimum 10 earth pits for earth Mat & Body earthing , 4 nos. for Neutral earthing and 04 nos. for LA earthing and as per detailed layout. | | |

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|---|---|---|---|
| | F- Installation of 06 nos. of 10m height 3mm thick Octagonal GI street light pole of reputed make with 90 W street light fitting, base plate, foundation bolts and single lighting GI arm bracket with fasteners including supply of all civil materials like cement, metal & sand etc for making foundation and cabling from LT panel. Supply and providing of necessary timer circuit for auto charging of lights. Make shall be approved by BHEL/ Engineer .(Per Sub Station). | | |
| | G-Erection and commissioning of 250A out door type Floor mounted Power distribution board (PDB), IP 55 protection, Double Door type, Incomer - 01no 250A TPN MCCB .Out Going -04 nos 63A TPN MCB, 03 nos 40A TPN ELCB with 30mA tripping ,02 nos 32 A TPN MCB's withTimer & contactors for auto on /off and 3 indicating lamps with fuse for indication bus supply ON, Digital volt meter &VSS 0-500V , suitable bus bar arrangement for phase and neutral.Sufficient space should be provided in the removable cable gland plate to accommodate 1R 3.5CX185 Sq.mm incoming cable and out going cables of diffenent sizes. All MCCB , MCBs and ELCBs are reputed makes . | | |
| | I- Suppy & fixing of 15 nos. 6.6 and 11 kV safety danger boards of standard size (Per Substation). | | |
| 6.14 | Underground laying of 6.6kV HT Cable( 1CX630 SqMM supplied by BHEL) along with civil works ( excavation,laying, filling , | 6000 | Mtrs |

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| | finish, other items etc) from incoming feeder to Substation | | |
| 6.15 | Erection of Heat shrink type HT Indoor termination kits of reputed make for 6.6 kV 1C x 630 sq.mm Alu. XLPE cable. | APR | Nos. |
| 6.16 | Erection Heat shrink type HT outdoor termination kits of reputed make for 6.6 kV 1C x 630 sq.mm Alu. XLPE cable. | APR | Nos. |
| 6.17 | Erection of Heat shrink type HT straight through jointing kits of reputed make for 6.6 kV 1C x 630 sq.mm Alu. XLPE cable. | APR | Nos. |
| **7.00** | **ERECTION, TESTING & COMMISSIONING PORTION OF BOM FOR 11KV OH LINE , 11KV/433V SUBSTATION & AREA LIGHTING** | | |
| 7.01 | Erection of 9.1m long pre-stressed cement concrete poles (PSCC). The erection includes excavation of earth of size 0.8x0.8x1.5m depth grouting with concrete of ratio 1:4:8 for size of 0.8x0.8x1.5m depth including supply of cement, sand, metal etc for the foundation and Coping of poles by 1 feet height. ( including BHEL supplied poles) | 400 | Nos. |
| 7.02 | Erection of 11m steel poles- ISMB 200X100 24.2 kg/m as per IS. The erection includes excavation of earth of size 1x1x1.8 m depth, grouting with concrete of ratio 1:4:8 for size of 1x1x1.8 m depth including supply of cement, sand, metal etc for the foundation and Coping of poles by 1 feet hight. | 44 | Nos. |
| 7.03 | Erection of 11kV 'V' Cross arms/Straight Arm with suitable back clamps including | 220 | Nos. |

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| | Alu. Painting as per IE specification. | | |
| 7.04 | Erection of 11kV top fittings (I Clamp) with suitable back clamps including Alu. Painting as per IE specification. | 220 | Nos. |
| 7.05 | Erection of 11kV disc insulator with fixing & conductor and holding clamp as per IS: 3188/1965 & IEC 309/1969/Latest. (Each set consist of all 3 Phases). | 30 | Sets |
| 7.06 | Erection of 11kV pin insulator with pins as per IS: 2544/1963 AMD 125 & IEC 168/1969 Latest. (Each set consist of all 3 Phases). | 250 | Sets |
| 7.07 | Erection of 11kV 400A Air break switch -double break-horizontal mounting rotating type as per ISS/IEC Spec No.4710/1968-265-C/1970/Latest suitable for three phases. | 20 | Nos. |
| 7.08 | Erection of 11kV Lightning arrestor set as per ISS/IEC Spec No. IS307/2-1985/Latest.(Each set consist of all 3 Phases). | 20 | Sets |
| 7.09 | Erection of 11kV HG fuse as per ISS/IEC Spec IS: 9385/Latest. (Each set consist of all 3 Phases). | 2 | Sets |
| 7.10 | Erection of 11kV DO fuse as per ISS/IEC Spec IS: 9385/Latest. (Each set consist of all 3 Phases). | 20 | Sets |
| 7.11 | Erection of 11kV GI stay (7/3.15mm) sets with Guy, Bow, Stay Rod, wire etc. as per I.E. Specifications.The erection includes excavation of earth of size 0.8x0.8x1.0 m depth, | APR | Sets |

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| | grouting with concrete of ratio 1:4:8 for size of 0.8x0.8x1.0 m depth including supply of cement, sand, metal etc. | | |
| 7.12 | Stringing of 7/4.09 ACSR DOG conductors as per IS:398/1961. (To meet 3 phases/lines of 4.5km each.). | 13.5 | km |
| 7.13 | Overhead installation & commissioning of 11kV HT cable (3CX240Sq. MM) including poles and al accessories (HT Cable shall be supplied by BHEL) | 4000 | mtr |
| - | **11KV/433V-PACKAGE SUBSTATIONS( Lump sum rate to be quoted)** | - | - |
| 7.13 | Supply of materials as required for erection, testing & commissioning of 11kV/433V Package Substation. | 18 | Set |
| | A- Leveling of substation yard, supply and spreading of 40mm size stone aggregate of 75mm thick for an area of size 8m x 6m, supply and construction of Brick work with cement mortar 1:6 of 230 mm thick and 450 mm height all-round the substation yard, plastering the brick work in CM 1:6 , white washing etc complete. (Per Sub Station). | | |
| | B- Supply and construction of foundation as per supplier foundation drawing for 500kVA -16 nos. and 250 kVA-2 nos. Package Substation. Appx size 4400 mm x 4400 mm x500 mm height (size may slightly vary as per new order of PSS) from ground level and including excavation of plinth pit and base concreting and plastering, white washing etc… | | |

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| | as per the instruction of BHEL site engineer. | | |
| | C- Supply and fixing of 3.15mm GI chain linked wire fencing height 2m for the substation of size 8m x 6m including grouting of 3m height ISA 75 fabricated posts at an interval of 1.5m (2m vertical 0.5m slanting, 0.5m grouting) and three runs of barbed wire along with the fencing on the slanting angle post, fixing of mesh with post by 50x6mm MS flat with fasteners (2 nos./post) and earthing of fencing by 8 SWG GI wire and providing finish aluminum painting of all steel materials etc. Supplied structural steel materials are used for fencing posts .(Per Sub Station) | | |
| | D-.Supply and installation of 1m x 2m height MS gate made of MS Angle, channel/rolled sections including supply and fixing of hinges, locking arrangement etc including providing finish aluminum painting etc. (Per Sub Station) | | |
| | E-Supply and Erection of 3m long 50mm dia 3.6 mm thick medium class GI funnel type earth electrode with filling of bentonite earthing powder as per standard, four side brick work chamber with cement plastering, white washing and removable type RCC/ cast iron cover plate. Scope includes supply of required betonite | | |

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| | eathing powder, cement, brick, sand, RCC/cast iron cover plate. **Minium 06 earthpits per sub station.** Sub station earthing shall be carried out by using supplied 50X6, 25X6 and 25X3 mm earth flats. | | |
| | F-Supply and erection 2 nos. 5m height 3mm thick conical GI street light pole of reputed make with 40W LED street light fitting with base plate, foundation bolts and single lighting GI arm bracket with fasteners including suplly all civil materials like cement , metal & sand etc for making foundation and cabling from LT panel. Supply and providing of necessary timer circuit for auto charging of lights. Make shall be approved by BHEL/ Engineer | | |
| | G- supply and installation of two numbers vertical air terminations, 6m height 50 mm NB 3.6mm thick medium class GI Pipe with 1m height lightning spike on the top (total height -7m) with suitable Base plate &foundation bolts for Ligtning protection of PSS. Vertical air terminal shall be grounded with earth pits. Required civil works for lightning pole erection and grouting including supply of grouting civil materials are in the scope of Contractor. (Per Sub Station) | | |
| | H- Suppy & Fixing of 06 nos. 11kV danger board of standard size (Per Sub Station). | | |

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| | E&C, filtration, civil foundation etc of BHEL supplied items ( 12 no 500 kVA Package SubStation, 2 no 500kVA oil type transforemer, 2 no VCB etc) | | |
| 7.15 | Laying of 3Cx 240 sq.mm 11kV XLPE HT Power cable U/G ( cable will be supplied by BHEL). | 2000 | m |
| 7.16 | Erection of Heat shrink type HT Indoor termination kits of reputed make for 11 kV 3C x 240 sq.mm Alu. XLPE cable. | APR | Nos. |
| 7.19 | Erection Heat shrink type HT outdoor termination kits of reputed make for 11 kV 3C x 240 sq.mm Alu. XLPE cable. | APR | Nos. |
| 7.20 | Erection of Heat shrink type HT straight through jointing kits of reputed make for 11 kV 3C x 240 sq.mm Alu. XLPE cable. | APR | Nos. |
| 7.21 | Erection of 150mm NB 4.8mm thick medium class GI pipes for make use of cable crossing where ever required such as existing culverts, trenches and road etc. | APR | m |
| 7.22 | Erection of 11 kV TWO pole structure arrangement using of angle, channels, clamping, earthing etc and Aluminium Painting of steel structures and colour washing of PSCC poles . | 10 | MT |
| 7.23 | Erection of 10 m height 3mm thick Octagonal GI street light pole with base plate, foundation bolts ,single lighting GI arm bracket, fixing of 90W LED street light fitting & Junction box, internal cabling with 3core 1.5 sq. mm flexible cable from JB to fitting, earthing, termination of incoming & outgoing cable includinng GI Pipe erection, | APR | Nos. |

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| | supply and fixing of necessary GI coil earthing including supply of all civil materials and all civil works excavation, foundation concrete as per suppliers drawing, coping, painting etc. | | |
| 7.24 | Erection of outdoor type metal clad LT distribution board (LTDB) IP -55 Protection with one incomer with 400A TPN CHANGE OVER SWITCH for EB supply & DG SET POWER SUPPLY and 2 nos. 200 A and 2 nos outgoing feeders with 63 A TPN MCBs, 3 indicating lamps with fuse for indication bus supply ON, Voltmeter & VSS 0-500V etc. Sufficient space should be provided for the removable cable gland plate to accommodate the power cable and all outgoing cables from suitable connectors from each MCB / ELCB. Neutral link bar for incoming and outgoing neutrals. | 5 | Nos. |
| 7.25 | Erection of out door type Lighting distribution board (LDB) IP -55 protection Double door type with one incomer with 200A TPN MCCB and 03 nos. 63A TPN MCB out going feeders, 3 nos. outgoing feeders with 40A 4pole ELCB 100 mA tripping, 6 nos. outgoing feeders with 32 A TPN MCBs and Timer & contactors for auto on/off street lights and 3 indicating lamps with fuse for indication bus supply ON, Voltmeter & VSS 0-500V etc. Suitable busbar arrangement for Phase and Neutral . Sufficient | 5 | Nos. |

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| | space should be provided in the removable cable gland plate to accommodate incoming power cable and all outgoing cables and necessary all civil works. | | |
| 7.26 | Laying of 3.5Cx300 sq.mm LT Power cable | 1500 | m |
| 7.27 | Laying of 3.5Cx240sq.mm LT Power cable | 1500 | m |
| 7.28 | Laying of 3.5Cx35 sq.mm LT Power cable | 3000 | m |
| 7.29 | Laying of 3.5Cx70 sq.mm LT Power cable | 1500 | m |
| 7.30 | Laying of 3.5Cx16 sq.mm LT Power cable | 2000 | m |
| 7.31 | Making Cable end termination of 3.5Cx300 sq.mm LT Power cable including supply of Al.lugs. | APR | Nos. |
| 7.32 | Making Cable end termination of 3.5Cx240 sq.mm LT Power cable including supply of Al.lugs. | APR | Nos. |
| 7.33 | Making cable end termination of 3.5Cx35 sq.mm LT Power cable including supply of Al.lugs. | APR | Nos. |
| 7.34 | Making cable end termination of 3.5Cx70 sq.mm LT Powercable including supply of Al.lugs. | APR | Nos. |
| 7.35 | Making cable end termination of 3.5Cx16 sq.mm LT Powercable including supply of Al.lugs. | APR | Nos. |

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| 7.36 | Erection and Commissioning of out door type weather proof 11kV Pillar box IP 54 Protection as per IS with one no. Incoming and two nos. outgoing including erection of 3 nos. 3C x 240 sq. mm. reputed make heat shrink type HT Termination kits. (Excavation,making foundation are covered in civil scope). | 5 | Nos. |
| | **SUPPLY AND ERECTION** | | |
| 8.01 | Supply and fixing of HT cable route markers standard size with 1m height angle support . | 200 | Nos. |
| 8.02 | Supply and fixing of LT cable route markers standard size with 1m height angle support. | 100 | Nos. |
| 8.03 | Supply and fixing of Griddle Guards of length 15m, with 8 SWG GI Wire for Road crossing with necessary fixing arrangement etc, as per IS Specification. | 3 | Nos. |
| 8.04 | Supply and fixing of anti climb device (barbed wire) roled on the poles at 2m height as per I.E. specification and numbering of poles. | 250 | Sets |
| 8.05 | Supply and erection/ laying of 200 mm dia RCC hume pipes at a depth of 1m for road crossing of power cables. | 150 | m |
| 8.06 | Supply and Erection of 3m long 50mm dia 3.6 mm thick medium class GI funnel type earth electrode with filling of bentonite earthing powder as per standard, four side brick work chamber with cement plastering and removable type RCC/ cast iron cover plate. Scope includes supply of required bentonite earthing powder, cement , brick, sand, RCC/cast iron cover plate. | 20 | Nos. |

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| 8.07 | Supply and erection of Fire Buckets with stand floor mounted type of rigid & good quality - 4 nos. 10 ltr capacity Fire buckets per stand- Type & make shall be approved by BHEL/ Engineer. | 25 | Set |
| 8.08 | Supply and erection of Aluminium alloy 5kg CO2 fire extinguisher industrial type with ISI Mark of reputed make. Type & make shall be approved by BHEL/ engineer . | 25 | Nos. |
| | **SUPPLY AND ERECTION** | | |
| 9.01 | Erection of 65 x 10 mm GI earth flat. | APR | m |
| 9.02 | Erection of 50 x 6 mm GI earth flat. | APR | m |
| 9.03 | Erection of 25 x 5 mm GI earth flat. | APR | m |
| 9.04 | Erection of 25 x 3 mm GI earth flat. | APR | m |
| | **CIVIL Work** | | |
| 10.01 | Construction of 5mX 4m size 10 feet height Control room, including supply of required civil materials like cement, sand, bricks, metal, reinforcement rods etc. The control room is concrete roof, brick wall room with inside & out site plastering, cement flooring with necessary trench arrangements for control desk & UPS and two nos 4ftX 4 ft glass alu. slide type windows, one wooden door of normal size (2.1X 1.2m) with lock & key arrangement. Including painting of control room. Supply & providing of control room lighting with minimum 4 nos. of 40 W Tube light fitting , 2 nos. 1200 sweep ceiling fans and 4 nos of 40 W LED street light fitting for out side area lighting, necessary elecrical | 1 | Nos. |

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| | wiring for fans & lights with 02 nos 5A switched socket & 2 nos 15 A switched socket in lighting board, incoming main switch, earthing, incoming power connection etc. complete( Light fittings & fans are reputed make only). | | |
| 10.02 | Excavation of cable trench size 0.4 X1.0 m depth in hard rock for HT cable and 0.4X0.8 m depth for LT cable. After cable laying , the trench will be back filled with excavated earth materials / other outside earth materials with compaction. | 5000 | CUM |
| 10.03 | Supply and spreading of river sand in cable trench of 300 mm thick for protection of HT Power cable. | 300 | CUM |
| 10.04 | Supply and laying of red/ ash bricks in the cable trench for protection of HT Power cable. | 30000 | Nos. |
| | **TOTAL AMOUNT (PACKAGE A)** | | |
| - | **PACKAGE- B** | | |
| | **Rate schedule for maintenance of Construction Power Network & Area lighting.** | | |
| **11.0** | **OPERATION & MAINTENANCE** | | |

| | | | |
|---|---|---|---|
| 11.01 | Operation and running maintenance including attending breakdown jobs for the entire Construction Power Network and Area lighting covered in this contract (Erected and commissioned in package -A)+ high masts lighting system. There should be adequate amount of Electricians and helpers available at site round the clock for this Package along with a Site Incharge during day shifts. | 52 | Months |
| | **TOTAL AMOUNT (PACKAGE A+B)** | | |

**ACITIVITY BASED PAYMENT:**

**PAYMENT TERMS AND CONDITION**

| Sl. No | Desc | Payemnt % |
|---|---|---|
| **1** | Route survey, preparation of route drawing, Detailed SLD, Detailed 6.6/11 kV and 11kV/433V substation drawing, 6.6kV & 11kV distribution drawing etc as per TCC | 0.50 |
| 2 | 2 nos of 5 MVA Transformer, 4 nos RMU panels and all accessories to make 5 MVA substation - On Completion of Supply. | 9.00 |
| **3** | 2 Nos 5 MVA Substation including HT Cable laying , RMU panels and all accessories to make 5 MVA substation - On Completion of Installation, Testing & Commissioning, all accessories for charging the system and on clearance of statutory authority for charging the system | 7.50 |
| 4 | Installation, Testing & Commissioning, all accessories for charging the system and on clearance of statutory authority for charging the system of Packaged Substations consisting of all accessories @ 0.70% of contract value each for each 500 kVA Packaged Substation (16 nos) and @ 0.40% of contract value each for each 250 KVA Packaged Substation (02 nos) . | 12.00 |
| 5 | Underground/Overhead laying & commissioing of HT Cables along with other accessories@0.20% / km (12 kms) | 2.40 |
| **6** | Supply of ACSR Dog conductor along with all accessories as per TCC @0.40 % of contract value/kilometer (15 kms) | 6.00 |
| 7 | Installation, laying & commissioning of ACSR Dog conductor along with all accessories (including poles, material ,Insulators,civil works etc) as per TCC @0.15 % of contract value/kilometre .(approx 15 kms) | 2.25 |
| **8** | Laying of HT Cable ( Underground/Overhead) inclding civil works, civil material, Termination kits, glands etc as per TCC @0.30 % of contract value/kilometre .(approx 12 kms) | 3.60 |

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|---|---|---|
| 9 | Supply of LT Cables as per TCC @1.50 % of contract value/kilometre .(approx 10 kms) | 15.00 |
| **10** | Laying of LT Cables ( Underground/Trays) inclding civil works, civil material, Termination kits, glands etc as per TCC @0.22 % of contract value/kilometre .(approx 10 kms) | 2.20 |
| 11 | Supply, Civil, Erection, Installation & Commissioing of Nitrogen Injected Fire Protection System for 02 nos 5MVA Transformer including all accessories as per TCC | 4.50 |
| **12** | Supply of 800A, 11kV/415V LT Distribution baord as per TCC @0.50 % of contract value/No (04 nos) | 2.00 |
| 13 | Supply , Civil works, Erection & Commissioing of all the items (cable, JB,Luminaire etc) related to Area Lighting of Main plant complete in all respect @0.06 % of contract value/pole ( for 100 poles) | 6.00 |
| **14** | Supply and E&C of all other construction power equipment complete in all respect for distribution purpose as per TCC . | 12.00 |
| 15 | Monthly charges for the services to be provided for each 500KV Package Substation @ 0.017% of contract value for each substation {i.e. % Break up payment (14.14%) / 500 KVA No. of Substations (16) / No. of hiring months (52)} Payment will be made pro-rata basis from the date of commissioning of respective substation treating the above fraction as monthly service charges. | 14.14 |
| **16** | Monthly charges for the services to be provided for 250KV package Sub-station @ 0.00875% of contract value for each substation {i.e. % Break up payment (0.91 %) / 250 KVA No. of Substations (2) / No. of hiring months (52)} Payment will be made pro-rata basis from the date of commissioning of respective substation treating the above fraction as monthly service charges. | 0.91 |
| | **TOTAL** | **100.00** |

**Major Notes:**

1. **Supplied material by contractor as mentioned in contract, will become BHEL's property after supply. Contractor will have to transfer the ownership of all the supplied items after charging.**
2. **In case project is not completed within 52 months, then O&M of construction power shall prevail even after 52 months and contractor is bounded to extend the contract as per the time schedule propose by BHEL Engineer.**
3. **Contractor to ensure less than 2% of breakdown/downtime. Contractor to attend the breakdown/downtime to ensure the 98% of uptime. Penalty shall be imposed by 0.05% of contract value for each % downtime below 98% up to maximum of 10% of contract value. This shall be calculated on monthly basis.**
4. 

| **Payment Break-up Milestone from Sl no. 1 to 14 of above mentioned table except O&M activity** | **Time** |
|---|---|
| 80% of allocated amount against each item | After Completion of activity as mentioned against each item |
| 20% of allocated amount against each item | After Charging of Plant |

**B. MONTHLY HIRING CHARGES FOR PROVIDING SERVICES DURING THE EXTENDED HIRING PERIOD (IF ANY) APPLICABLE.**

BHEL may extend the contract period for services to be provided as specified in the tender specification depending up on the requirement and it shall be reviewed at appropriate time.

## TAXES, DUTIES, LEVIES (Rev 14 dated 09/10/2020)

1. All taxes excluding GST, GST Cess **& BOCW** Cess **but including, Royalties, fees, license, deposits, commission, any State or Central Levy and other charges whatsoever, if any, shall be borne by you and shall not be payable extra.**

2. Any increase of the taxes excluding GST, GST Cess & BOCW **Cess**, at any stage during execution including extension of the contract shall have to be borne by the contractor. Quoted/ accepted rates/ price shall be inclusive of all such requirements. Please note that since GST on output will be paid by BHEL separately as enumerated below, your quoted rates/ price should be after considering the Input Credit under GST law at your end.

3. **GST :**
   The successful bidder shall furnish proof of GST registration .GST along with Cess (as applicable) legally leviable & payable by the successful bidder as per GST Law, shall be paid by BHEL. Hence Bidder shall not include GST along with Cess (as applicable) in their quoted price.

4. GST charged in the Tax Invoice/Debit note by the contractor shall be released separately to the contractor only after contractor files the outward supply details in GSTR-1 on GSTN portal and input tax credit of such invoice is matched with corresponding details of outward supply of the contractor and has paid the GST at the time of filing the monthly return

5. E-invoicing under GST has been implemented with effect from 1st October 2020 for all the taxable persons having turnover more than the threshold limit in any preceding financial year from 2017-18 onwards. Therefore, for all the taxable persons falling under the purview of E-invoice, it is mandatory to mention a valid unique Invoice Reference No. (IRN) and QR code as generated from E-Invoicing portal of the Government for the purpose of issuing a valid Tax Invoice. Only an E-invoice issued in the manner prescribed under rule 48(4) of CGST Rules shall be treated as valid invoice for reimbursement of GST amount.
   If the successful Bidder is not falling under the purview of E-Invoicing then he has to submit a declaration in that respect along with relevant financial statements.

6. Bidder shall note that the GST Tax Invoice complying with GST Invoice Rules (Section 31 of GST Act & Rules referred there under) wherein the 'Bill To' details will as below:
   BHEL GSTN – As per **Annexure -1**
   NAME -- Bharat Heavy Electricals Limited
   ADDRESS – Site address

7. Bidder to immediately intimate on the day of removal of Goods (in case of any supply of goods) to BHEL along with all relevant details and a scanned copy of Tax Invoice to below email ids to enable BHEL to meet its GST related compliances :-
   Email id ---- to be intimated later on.
   In case of delay in submission of the abovementioned documents on the date of dispatch, BHEL may incur penalty /interest for not adhering to Invoicing Rules under GST Law. The same will be liable to be recovered from the successful bidder, if such delay is not attributable to BHEL.
8. In case of raising any Supplementary Tax Invoice (Debit / Credit Note) Bidder shall issue the same containing all the details as referred to in Section 34 read with Rule 53.

9. Bidder shall note that in case GST credit is delayed/ denied to BHEL due to delayed / non receipt of goods and /or tax invoice or expiry of the timeline prescribed in GST Law for availing such ITC, or any other reasons not attributable to BHEL, GST amount shall be recoverable from the vendor along with interest levied / leviable on BHEL, as the case may be.

10. Bidder shall upload the Invoices raised on BHEL in GSTR-1 within the prescribed time as given in the GST Act. Bidder shall note that in case of delay in declaring such invoice in your return and GST credit availed by BHEL is denied or reversed subsequently as per GST Law , GST amount paid by BHEL towards such ITC reversal as per GST law shall be recoverable from the bidder along with interest levied / leviable on BHEL.

11. Way Bill: Successful Bidder to arrange for way bill / e-waybill for any transfer of goods for the execution of the contract.

    The Bidder has to make their own arrangement at their cost for completing the formalities, if required, with Issuing Authorities, for bringing materials, plants & machinery at site for execution of the works under this contract, Road Permit/ Way Bill, if required, shall be arranged by the contractor and BHEL will not supply any Road Permit/ Way Bill for this purpose.

12. **New taxes and duties**:-Any New taxes & duties, if imposed subsequent to due date of offer submission as per NIT & TCN, by statutory authority during contract period including extension, if the same is not attributable to you, shall be reimbursed by BHEL on production of relevant supporting document to the satisfaction of BHEL. However, you shall obtain prior approval from BHEL before depositing new taxes and duties.
    Benefits and/or abolition of all existing taxes must be passed on to BHEL against new Taxes, if any, proposed to be introduced at a later date.
    In case any new tax/levy/duty etc. becomes applicable after the date of bidder's offer but before opening of the price bid, the bidder must convey its impact on his price duly substantiated by documentary evidence in support of the same before opening of the price bids. Claim for any such impact after opening the price bid will not be considered by BHEL for reimbursement of tax or reassessment of offer.

13. For transportation work, bidder shall declare in his quotation whether he is registered under GST, if yes, whether he intends to claim GST on forward charge basis. In absence of this declaration, BHEL will proceed further with the assumption that bidder intends not to claim GST on forward charge basis. However, in case of GST registered transporter, the amount to the extent of goods and service tax will be retained till BHEL avails the credit of GST. Further, transporter shall issue tax invoice which inter alia includes gross weight of the consignment, name of the consigner and the consignee, registration number of vehicle in which the goods are transported, details of goods transported, details of place of origin and destination, GSTIN of the person liable for paying tax whether as consigner, consignee or goods transport agency, and also containing other information as mentioned under rule 46.

14. **TDS under Income Tax shall be deducted at prevailing rates on gross invoice value from the running bills unless exemption certificate from the appropriate authority/ authorities is furnished.**

15. **TDS under GST shall be deducted at prevailing rates on applicable value from the running bills.**

16. **TCS under Income Tax 1961 has been implemented with effect from 1st October 2020 for every seller having turnover more than threshold limit during financial year immediately preceding financial year in which the sale of goods is carried out, who receives any amount as consideration for sale of any goods of the value or aggregate of such value exceeding threshold limit other than export of goods or who is already covered under other provision of section 206C, collect from the buyer, TCS as per applicable rates of the sale consideration exceeding threshold limit subject to following conditions**
    i. Buyer shall be as per clause (a) of section 206C- (1H)
    ii. Seller shall be as per clause (b) of section 206C- (1H)
    iii. No TCS is to be collected, if the seller is liable to collect TCS under other provision of section 206C or the buyer is liable to deduct TDS under any provision of the Act and has deducted such amount.

    **If Successful Bidder is falling under the purview of TCS then he has to submit a declaration in that respect along with relevant financial statements before the start of work or if bidder is falling under preview of TCS during the work in progress then bidder is compulsorily required to submit relevant financial statement in the beginning of the respective FY.**

    **For TCS claim, vendor has to submit relevant documents required as per Income Tax Act.**

17. Refer Annexure – 2 for BOCW Act & Cess Act.

**ANNEXURE-1**

**State wise GSTIN no.s of BHEL**

| Sl. No | Projects under state | GSTIN |
|---|---|---|
| 1 | Andhra Pradesh | 37AAACB4146P7Z8 |
| 2 | Bihar | 10AAACB4146P1ZU |
| 3 | Chhattisgarh | 22AAACB4146P1ZP |
| 4 | Gujarat | 24AAACB4146P1ZL |
| 5 | Jharkhand | 20AAACB4146P5ZP |
| 6 | Madhya Pradesh | 23AAACB4146P1ZN |
| 7 | Maharashtra | 27AAACB4146P1ZF |
| 8 | Orissa | 21AAACB4146P1ZR |
| 9 | Telangana | 36AAACB4146P1ZG |

**ANNEXURE-2**

**BOCW Act & Cess Act**

Bidder may please note that the sub-contractor/bidder of BHEL engaging building or construction worker in connection with building or other construction work, are required to follow the procedures enumerated below:

1. It shall be the sole responsibility of the contractor as employer to ensure compliance of all the statutory obligations under the Building and other Construction Workers' (Regulation of Employment and Conditions of Service) Act, 1996 and the Building and other Construction Workers' Welfare Cess Act, 1996 and the rules made thereunder.
2. It shall be sole responsibility of the contractor engaging Building Workers in connection with the building or other construction works in the capacity of employer to apply and obtain registration certificate specifying the scope of work under the relevant provisions of the Building and Other Construction Workers' (Regulation of Employment and Conditions of Service) Act, 1996 from the appropriate Authorities.
3. It shall be responsibility of the contractor to furnish a copy of such Registration Certificate within a period of one month from the date of commencement of Work.
4. It is responsibility of the contractor to register under the Building and other Construction Workers' Welfare Cess Act, 1996 and deposit the required Cess for the purposes of the Building and other Construction Workers' (Regulation of Employment and Conditions of Service) Act, 1996 at such rate as the Central Government may , by notification in the Official Gazette, from time to time specify. However, before registering and deposit of Cess under the Building and other Construction Workers' Welfare Cess Act, 1996, the contractor will seek written prior approval from the Construction Manager.
5. It shall be sole responsibility of the contractor as employer to get registered every Building Worker, who is between the age of 18 to 60 years of age and who has been engaged in any building or other construction work for not less than ninety days during the preceding twelve months as Beneficiary under the Building and other Construction Workers' (Regulation of Employment and Conditions of Service) Act, 1996.
6. It shall be sole responsibility of the contractor as employer to maintain all the registers, records, notices and submit returns under the Building and other Construction Workers' (Regulation of Employment and Conditions of Service) Act, 1996 and the Building and other Construction Workers' Welfare Cess Act, 1996 and the rules made thereunder.
7. It shall be sole responsibility of the contractor as employer to provide notice of poisoning or occupation notifiable diseases, to report of accident and dangerous occurrences to the concerned authorities under the Building and other Construction Workers' (Regulation of Employment and Conditions of Service) Act, 1996 and the rules made thereunder and to make payment of all statutory payments & compensation under the Employees' Compensation Act, 1923.
8. It shall be the responsibility of the sub-contractor as employer to make payment/deposit of applicable cess amount on the extent of work involving building or construction workers engaged by the sub-contractor within a period of one month from the receipt of payment. It shall also be responsibility of the Contractor to furnish BHEL on monthly basis, Receipts/ Challans towards Deposit of the Cess under the Building and other Construction Workers' Welfare Cess Act, 1996 and the rules made thereunder along with following statistics :

   (i)Number of Building Workers employed during preceding one month.

   (ii) Number of Building workers registered as Beneficiary during preceding one month.

(iii)Disbursement of Wages made to the Building Workers for preceding wage month.

(iv) Remittance of Contribution of Beneficiaries made during the preceding month

9. BHEL shall reimburse the contractor the Cess amount deposited for the purposes of the Building and other Construction Workers' (Regulation of Employment and Conditions of Service) Act, 1996 under the Building and other Construction Workers' Welfare Cess Act, 1996 and the rules made thereunder. However, BHEL shall not reimburse the Fee paid towards the registration of establishment, fees paid towards registration of Beneficiaries and Contribution of Beneficiaries remitted.

10. It shall be responsibility of the Building Worker engaged by the Contractor and registered as a beneficiary under the Building and other Construction Workers' (Regulation of Employment and Conditions of Service) Act, 1996 to contribute to the Fund at such rate per mensem as may be specified by the State government by notification in the Official Gazette. Where such beneficiary authorizes the contractor being his employer to deduct his contribution from his monthly wages and to remit the same, the contractor shall remit such contribution to the Building and other construction Workers' Welfare Board in such manner as may be directed by the Board , within the fifteen days from such deduction.

11. Bidders may please note that though the quoted price is exclusive of BOCW (which will be reimbursed by BHEL as per sub-clause 9 above) , however, If at any point of time during the contract period, non-compliance of the provisions of the Building and other Construction Workers' (Regulation of Employment and Conditions of Service) Act, 1996 and the Building and other Construction Workers' Welfare Cess Act, 1996 and the rules made thereunder is observed, BHEL reserves the right to deduct the applicable cess (1%) on the contract value and penalty ( if any, imposed by Cess Authorities) from the payables on account of non-compliance.

12. The contractor shall declare to undertake any liability or claim arising out of employment of building workers and shall indemnify BHEL from all consequences / liabilities / penalties in case of non-compliance of the provisions of the Building and other Construction Workers' (Regulation of Employment and Conditions of Service) Act, 1996 and the Building and other Construction Workers' Welfare Cess Act, 1996 and the rules made thereunder.