भारत हेवी इलेक्ट्रिकल्स लिमिटेड
BHARAT HEAVY ELECTRICALS LIMITED
(A Government of India Undertaking)
पारेषण व्यापार समूह, नोएडा/Transmission
Business Group, Noida

निविदा आमंत्रण सूचना
NOTICE INVITING TENDER

Sir/Madam,

Bharat Heavy Electricals Limited (hereinafter referred to as **BHEL**) is a Central Public Sector Enterprise, having its Branch office at Transmission Business Group, 5TH Floor, Plot no.:- 25A, Sector-16A, Noida, Distt. Gautambudh Nagar, UP-201301, invites offer in sealed cover under two part bid system (Part-I: Techno commercial Part & Part-II: Price Part) from the competent agencies for "Supply of 400 kV XLPE Cable & accessories including the services for Vishnugad Pipalkoti Hydro Electric Project (4X111 MW)"

Please submit your competitive offer for the above subject work as per the tender terms & conditions.

SCHEDULE TO TENDER

1.	*Tender Reference No.*	***92G2400174***
2.	*Date of Issue of Tender:*	***15.09.2023***
3.	*Type of Tender:*	*Open Tender/ Global Tender*
4.	*Tender Title:*	***"Supply of 400 kV XLPE Cable & accessories including the services for Vishnugad Pipalkoti Hydro Electric Project (4X111 MW) "***
5.	*Tender issuing Authority*	*BHEL- Transmission Business Group, 5TH Floor, Plot no.:- 25A, Sector-16A, Noida, Distt. Gautambudh Nagar, UP-201301*
6.	*Last date/ time for receipt of tender:*	***13.10.2023 11:00 HRS***
7.	*Date/ time of opening of (Part-I):*	***13.10.2023 16:00 HRS***
8.	*Offer/Bid submission mode*	*Tender is invited through e-Procurement System only. The bidder shall submit their bid through e-Procurement platform at* ***https://eprocurebhel.co.in****. For Details bidder may please refer Clause no. 02 of Special terms & Conditions.* *Pre bid Meeting: 26.09.2023 11:00 HRS* *Pre Bid Meeting place: BHEL TBG,Plot No 25, Sector 16A, Noida.* *Pre bid meeting allowed & shall be within 7-15 days from the date of enquiry/NIT.*
9.	*Tender will be opened at:*	*BHEL TBG– HQ Noida of above mentioned address at point no. 5.*
10.	*Date/Time of price bid opening:*	*Will be intimated separately to the Techno-commercially qualified bidders in due course of time.*
Note:- For other instructions; bidder may please refer the Additions Terms & Conditions and Special terms & conditions		

All corrigenda, addenda, amendments, Bid Submission extension, clarifications, etc. to the tender will be hosted on website **http://www.bhel.com** and **https://eprocurebhel.co.in** only. Bidders should regularly visit website till the due date of submission to keep themselves updated. Any clarification(s) regarding Notice Inviting Tender (NIT), if required, should be sought before the tender due date from the officials as mentioned at Clause no. 03 & 04 of special terms conditions;.

Thanking you,

For & on behalf of
Bharat Heavy Electricals Ltd.

TABLE OF CONTENTS/ INDEX

PART-I

Sections/Annexures	Contents
1	NOTICE INVITING TENDER
2	TABLE OF CONTENTS
3	SPECIAL TERMS & CONDITIONS OF TENDER
4	ADDITIONAL TERMS & CONDITIONS OF TENDER
5	STANDARD GENERAL TERMS & CONDITIONS (Doc. No.:- BHEL/TBG/GTC/2016 Rev 01)
6	STANDARD GENERAL TERMS & CONDITIONS (SERVICE-PORTION) (Doc. No.:- BHEL/TBG/GTC-ETC/2016)
7	Technical Specification No.;- TB-382-316-005 Rev 00
8	BHEL's UNPRICE BID FORMAT
9	List of ANNEXURES :- i) Pre- Qualification Requirement(PQR)- (Annexure-I) ii) Activity Schedule (Annexure-II), iii) Billing Checklist – (Annexure-III) iv) Arbitration:- (Annexure-IV) v) Format for declaration of minimum local content (Annexure-V). vi) Instruction of DPIIT Compliance to GOI Order for restrictions under Rule 144 (xi) of General Financial Rules (GFRs), 2017 (Annexure-VI, VII/ VIII (whichever applicable) vii) MOP circular dated 02-07-2020 and its subsequent amendment, if any, in prescribed format (Annexure-IX/ X). viii) Format of Integrity pact (Annexure-XI). ix) Risk & Cost Clause (Annexure-XII) x) Template of Vendor Approval (Annexure-XIII) xi) Copy of HSE policy (Annexure-XIV) xii) Format of Performance BG (Annexure –XV). xiii) List of Banks for the Submission of Performance Bank Guarantee xiv) PVC Clause (Annexure-XVI)
10	Commercial and Technical deviation sheet

PART-II

The BOQ -Price bid contains two work sheets named BoQ1 & BoQ2. The applicability of the separate BOQs are as below:-

Sl No.	BOQ Work Sheet No.	Applicability
1	**BoQ1**	**Applicable for Indian Bidders Only**, who have opted to quote all the items in INR.
4	**BoQ2**	**Applicable for Foreign bidders,** who have opted to quote all the items in USD

As regards Total of Prices quoted by bidders as appearing in rows after Item Sr No 2.13 of Price Bid Formats i.e Rows starting with "Total in figures "and "Quoted rate in words "are for Indication /Control Purpose, It is clarified that Evaluation will be made as per Clause regarding Tender Evaluation I,e clause mentioned at Sr No 11 of Special Terms and Conditions (Document No BHEL/TBG/STC/Vishnugad Pipalkoti/CABLE -Rev 00) .

For Further details, bidder may please refer the Clause No. 5 of "Additional terms & conditions" and relevant Clauses.

Enquiry No:- 92G2400174 dated 15.09.2023
Item: 400kV XLPE Cable & Accessories [Supply + Services]
Project: THDC Vishnugad Pipalkoti Hydro Electric Project (4X111 MW)

Special Terms and conditions

Scope is supply and services.

Project: THDC Vishnugad Pipalkoti Hydro Electric Project (4X111 MW)

Note:-

1) **This is the Special Terms & Conditions for the procurement of the 400 kV XLPE Cable & Accessories (Supply+ Services) for THDC Vishnugad Pipalkoti Hydro Electric Project (4X111 MW)**
2) **This Special Terms & Conditions Shall supersede all the special terms & Conditions.**
3) **This special Terms & Conditions shall be applicable for this enquiry with immediate effect.**
4) **This is a Global tender, all applicable GOI (Government of India) Guidelines wrt global tender enquiry (GTE) shall be applicable for this NIT. 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".**
5) **In case any discrepancy between the requirements mentioned under General Terms and conditions (GTC- SUPPLY & ETC)-Rev-01 and Special Terms and conditions, the Special Terms and conditions shall prevail.**

SPECIAL TERMS & CONDITIONS

(Document No.:- BHEL/TBG/STC /Vishnugad Pipalkoti /CABLE -Rev 00)

Enquiry No:- 92G2400174 dated 15.09.2023
Item: 400kV XLPE Cable & Accessories [Supply + Services]
Project: THDC Vishnugad Pipalkoti Hydro Electric Project (4X111 MW)

Sl No.	GTC Clause No.	Special Terms & Conditions
1	**Clause no. 1.2 of GTC**	Offer Submission Time: 11 Hrs IST Offer Opening Time: 16 Hrs IST The critical Dates of tendering activities shall be provided separately during tendering processes. Address of tender Issuing Authority:- BHARAT HEAVY ELECTRICALS LIMITED, TRANSMISSION BUSINESS GROUP, 5TH Floor, Plot no.:- 25, Sector-16A, Noida, Distt. Gautambudh Nagar, UP-201301
2	**Clause no. 1.3 of GTC**	**Offer Submission Mode:-** Tender is invited through e-Procurement System only. The bidder shall submit their bid through e-Procurement platform at https://eprocurebhel.co.in. Vendors participating through e-procurement portal for this tender should have Class-III Digital Signature Certificate (DSC) for Signing & Encryption of bids issued by any of the valid Certifying Authorities (approved by Controller of Certifying Authorities) in India. Bidders may note that no other mode of bid submission except through NIC Portal shall be accepted by BHEL. The bid submitted by other mode except NIC Portal as mentioned above; shall not be considered for evaluation and shall be rejected The Notice Inviting Tender (NIT)/ the tender requirement of BHEL will not be henceforth published in newspapers. All the concerned are hereby notified that tender enquiries of BHEL will be published on BHEL tender website (www.bhel.com) and Government's Central Public Procurement Portal (https://eprocurebhel.co.in).
3	**Clause No. 1.7 of GTC** -	For any technical clarification, please contact Mr. Dileep K Shukla, DGM (TBEM) / Mr Vivek Kapil, AGM(TBEM) Contact No. +91 (0) 0120-6748533 / 8539; e-mail: dkshukla@bhel.in / vivekk@bhel.in (Mob No.): 9036077139 / 9818080691
4	**Clause No. 1.8 of GTC** -	For any commercial clarification, please contact Mr. Piyush Kumar Mishra Manager (TBMM) / Sh. Sunil Kumar, Sr DGM (TBMM); Contact No. 0120-6748575/ 8471; e-mail: piyush.kumar@ bhel.in; sunil.kumar@bhel.in (Mob No.):- 9453025414/09761724520
5	**Clause No. 2 of GTC**	2.1 Prices are on PVC basis for XLPE Insulated high Voltage Power Cable as

	-	per the Annexure-XVI. **2.2 Prices shall be quoted as under :** **(a) Supply : In INR in case of Indian Bidder** **In USD – In case of Foreign Bidder** **(b) ETC Charges i.e Services:** **Payment shall be made in INR (In case of Indian Bidder) In case of other bidders payment shall be made in USD.** **2.3 PRICES: The** Breakup of Prices shall be as under : ➢ **Supply (Indian Bidder)** a) DAP Price: Prices shall be quoted on delivered at place (DAP basis). Vendor shall bear the freight and insurance, packing & forwarding charges and all costs up to destination. **Destination : Vishnugad Pipalkoti HEP (4X111 MW)** **THDC India Limited** **Alaknanda Puram, Pipalkoti** **DIstt- Chamoli** **Uttarakhand- 246472** **India** b) GST (In case of Indian Bidder) ➢ **Supply (Foreign Bidder)** DAP Price: Prices shall be quoted on delivered at place (DAP basis). Vendor shall bear the freight and insurance, packing & forwarding charges and all costs up to destination.. **Destination : Vishnugad Pipalkoti HEP (4X111 MW)** **THDC India Limited** **Alaknanda Puram, Pipalkoti** **Distt- Chamoli** **Uttarakhand- 246472** **India** Foreign Bidders to Charges inclusive of All taxes and Duties. Foreign Bidders should quote in USD (US Dollar Only). **ETC Charges**: Price for ETC Charges shall be quoted by Bidder in Indian Rupee (in case of Indian Bidder). In case of foreign bidder i.e other than Indian bidder) Price shall be quoted by bidder in USD.

		Notes: 1. **Bidder should ensure that proper documents are provided to BHEL in advance.** 2. **Payment of custom duty (if any applicable), custom clearance of tools & tackles, plant equipment etc which are required to execute the services (i.e for Item no. 2.01 to 2.13) shall be in the scope of bidder.**
6	**Clause No. 3 of GTC** -	**Terms of payment :** TBG is registered with RXIL (TReDS) platform. MSME Bidders are requested to get registered with RXIL (TReDS) platform to avail the facility as per the GOI guidelines. **i) For Supply** **For Indian Bidder:-** a) 90% of payment with 100% GST (in case of Indian Bidder) within 90 days for non MSE/ 45 days for Micro and Small/ 60 days for Medium enterprises from the date of receipt of complete invoice along with documents in 3 sets (original + 2 copies) as follows: ·LR / GR duly endorsed by BHEL Site Official. ·Material Receipt Certificate issued by BHEL Site Official. ·GST Compliant Tax Invoice (In case of Indian Bidder) ·Packing List (Case-wise) . Copy of Transit Insurance Certificate from underwriters. ·Material Inspection Clearance Certificate (MICC) issued by BHEL Quality Management ·Guarantee Certificate ·Copy of Performance Bank Guarantee (PBG) ·Certificate of acceptance of Type Test Reports issued by BHEL Engineering Management, if applicable b) Balance 10% payment within 90 days for non MSE/ 45 days for Micro and Small/ 60 days for Medium from the date of receipt of complete invoice along with documents in 3 sets (original + 2 copies) as follows: ·Certificate of successful completion of Erection, Testing & Commissioning at Site issued by BHEL Site Official / Construction Management ·Certificate of completion of final documentation as per Purchase Order / Technical Specification issued by BHEL Engineering Management In case of Erection, Testing & Commissioning gets delayed beyond 18

		months from the date of last supply for the reasons not attributable to supplier, supplier may claim 5% (out of 10%) of payment of supply portion by furnishing following documents: a) Invoice b) Copy of certificate issued by BHEL site in charge, confirming that delay in Erection, Testing & Commissioning is not attributable to supplier (to be arranged by BHEL TBG). c) Copy of Bank Guarantee of equivalent value initially valid for 6 months from the date of submission of invoice with additional claim period of three months. Incase Erection, testing & Commissioning is not successfully completed before expiry of Bank Guarantee, BG shall be kept suitably extended till successful completion of Erection, testing & Commissioning. Last 5% (Out of 10%) payment shall be released as per the document required for balance 10% payment. **For Foreign Bidder:-** a) 90% of payment within 90 days from the date of receipt of complete invoice along with documents in 3 sets (original + 2 copies) as follows: ·Invoice · Delivery Challan (if applicable) or Packing List (Case wise) . Certificate of Origin . Transit Insurance certificate from under writers or copy of intimation of Transit Insurance duly endorsed by under writers (if applicable) .·Material Inspection Clearance Certificate (MICC) issued by BHEL ·Guarantee Certificate ·Copy of Performance Bank Guarantee (PBG) ·Certificate of acceptance of Type Test Reports issued by BHEL Engineering Management b) Balance 10% payment (Ex-work and F & I) within 90 days from the date of receipt of complete invoice along with documents in 3 sets (original + 2 copies) as follows: ·Certificate of successful completion of Erection, Testing & Commissioning at Site issued by BHEL Site Official / Construction Management ·Certificate of completion of final documentation as per Purchase Order / Technical Specification issued by BHEL Engineering

		Management In case of Erection, Testing & Commissioning gets delayed beyond 18 months from the date of last supply for the reasons not attributable to supplier, supplier may claim 5% (out of 10%) of payment of supply portion by furnishing following documents: a) Invoice b) Copy of certificate issued by BHEL site in charge, confirming that delay in Erection, Testing & Commissioning is not attributable to supplier (to be arranged by BHEL TBG). c) Copy of Bank Guarantee of equivalent value initially valid for 6 months from the date of submission of invoice with additional claim period of three months. In case Erection, testing & Commissioning is not successfully completed before expiry of Bank Guarantee, BG shall be kept suitably extended till successful completion of Erection, testing & Commissioning. Last 5% (Out of 10%) payment shall be released as per the document required for balance 10% payment.
7	**Clause No. 5 of GTC** -	**DEFECT LIABILITY (GUARANTEE SPECIFIC CLAUSE for Supply Portion)** The equipment / material supplied and services rendered (if applicable) shall be guaranteed to be free from all defects and faults in design & engineering, material, workmanship & manufacture and in full conformity with the Purchase Order / Contract, Technical Specifications & approved drawings / data sheets, if any. The defect Liability Period shall be 18 months from the date of Completion of the Facilities or 18 months from the date of last supply, whichever is later. **Note: Tentative date of Completion of facilities is Sept'2025.** The defective equipment / material / component shall be replaced free of cost at site. Freight & Insurance during transit shall also be in the scope of the supplier / contractor. Any expenditure for dismantling and re-erection of the replaced equipment / material / component shall be to supplier's / contractor's account. All replacements during the guarantee period shall be delivered at site promptly and satisfactorily within a period not more than 45 days (or any other time period informed by BHEL without affecting the project commissioning schedule) from the date of reporting the defect / rejection etc.

		In the event of the supplier / contractor failing to replace the defective equipment / material / component within the time period mentioned above, BHEL may proceed to undertake the replacement of such defective equipment / material / component at the risk and cost of the supplier / contractor without prejudice to any other rights under the contract and recover the same from PBG / other dues of this Purchase Order / Contract or any other Purchase Order / Contract executed by the supplier / contractor. Note- Notes as mentioned in GTC shall be applicable.
8	**Clause No. 07 of GTC for supply / Clause No 9 of GTC for ETC Portion**	**PERFORMANCE BANK GUARANTEE (PBG) :** Supplier shall arrange to submit Performance BG / Deposit on a non-judicial stamp paper of appropriate value along with first invoice or within 60 days from placement of Purchase Order (PO) whichever is earlier, in line with follows: - **For Supply-** PBG for 10% of the total Ex-works PO value, valid up to complete guarantee period with claim period of 3 months extra over and above the validity date. Ex-works PO value at the time of placement of PO shall be considered for calculation of the PBG amount. **For services-** PBG for 10% of the total Contract Value for ETC at Site excluding taxes & duties valid up to complete guarantee period with claim period of 3 months extra over and above the validity date. Supply date of BOQ Item Sr No 1.10, 1.11,1.12 & 1.13 will be exempted while deriving last supply date for PBG Validity period. In case of Extension of BG Period is required, bidder to ensure Extension of PBG accordingly to cover defect liability period. Note : The Bank Guarantee shall be from any bank as per Annexure for List of Banks (Attached herewith). The original PBG should be sent by issuing Bank directly to AGM (Finance), TBG, BHEL, Noida. ii) Extension of validity of the PBG in original, as per above clause, should be sent by issuing Bank directly to AGM (Finance), TBG, BHEL, Noida at least 45 days before expiry of validity of the PBG.

		iii) Unless otherwise specified in the NIT, deviation taken for non-submission of PBG / Deposit, as applicable, shall not be accepted. iv) In case of non–submission PBG / Deposit, as applicable, BHEL reserve the right for Risk Purchase as per terms of the NIT and impose Suspension of Business Dealings with the Supplier / Contractor. v) BHEL reserve the right to encash the Bank Guarantee and forfeit the amount in the event of any default, failure or neglect on part of the Supplier in fulfilment of performance of the Purchase Order. vi) Value of the Bank Guarantee (at the time of submission) shall remain unchanged for any subsequent variations in Purchase Order value up to ± 20%. Beyond this variation of ± 20%, the Supplier shall arrange to enhance or may reduce the value of the Bank Guarantee accordingly for the total variation promptly. vii) Vendor to ensure submission of Certificate of Final Documentation /Confirmation regarding Non applicability of Final Documentation, as the case may be, as referred in clause No 9 of GTC regarding Final Documentation. BG shall be released only after submission of the same to BHEL TBMM. BG for Main supply items , Spares and Services shall be submitted separately. "Bidder agrees to submit performance security required for execution of the contract within the time period mentioned. In case of delay in submission of performance security, enhanced performance security which would include interest (SBI rate + 6%) for the delayed period, shall be submitted by the bidder. Further, if performance security is not submitted till such time the first bill becomes due, the amount of performance security due shall be recovered as per terms and conditions defined in NIT / Contract, from the bills along with due interest.
9	**Clause No. 12 of GTC**	**Delivery Period: -** Delivery Plan – As per Activity Schedule [Annexure II]. The same shall be submitted in BHEL format along with commercial offer duly signed and stamped by authorized person. **Vendor to ensure the delivery plan as per Annexure –II.** In case, BHEL's delivery requirement is not met by vendor(s), then a chance may be given to all such vendors to review their quoted delivery

		schedule in line with BHEL's delivery requirement. In case such delivery plan is considered acceptable by BHEL, the offer shall be loaded with 0.5% of total cost to BHEL after considering the GST input (in case of Indian bidder) calculated based on price quoted by the bidder for the period for which delivery period sought by bidder exceed the delivery period mentioned in Activity schedule (Annexure-II). The same shall be informed to all techno-commercially acceptable bidders before price bid opening. BHEL's decision in this regard shall be final & binding to bidders. **It is sole discretion of BHEL to accept the delivery schedule offers by the bidder. BHEL's decision in this regard shall be final & binding to the bidder.**
10	**Clause No. 13 of GTC(Supply portion) / Clause No 15 of document No: BHEL/TBG/GTC-ETC/2016/Rev 01**	**LIQUIDATED DAMAGES:** LD shall be levied for delay in execution of Purchase Order as per below: a) In case of delay in supply of material beyond the contractual delivery time allotted for supply, an amount of 0.5% of the total Purchase Order value* per week of delay or part thereof subject to a maximum of 5% of the total Purchase Order value* shall be deducted as Liquidated Damages (LD) along with applicable GST (if any) on LD. b) In case of delay in providing the services beyond the contractual completion time allotted for services, an amount of 0.5% of the total Purchase Order value* per week of delay or part thereof subject to a maximum of 5% of the total Purchase Order value* shall be deducted as Liquidated Damages (LD) along with applicable GST (if any) on LD and the specific intimation thereof shall be given to the supplier immediately via mail or letter or online portal. The vendor shall submit a check list mentioning the pre-requisite conditions required to be fulfilled by BHEL site for starting the site activities. Upon compliance of the pre-requisite conditions as per check list and intimation to the vendor, the vendor shall depute the required manpower to site within 07 (seven) days of intimation. After reaching at site, the vendor representative will prepare a joint Minutes of meeting with BHEL site in which it will be mentioned that BHEL has completed the pre-requisite conditions as per check list and erection, testing & commissioning activities can be started from the specified date. This date will be taken a start date/ zero date for start of erection testing & commissioning activities.

		Note: 1) LD shall be calculated as per activity schedule of NIT. 2) In case of Services, delays (if any) shall be certified by concern site in-charge. 3) '*'Total Purchase Order Value for considering Liquidity Damages (LD)= (Total Ex-works +F&I +Total Service charges excluding GST). Note: (i)In case of any amendment / revision in PO /WO, the LD shall be linked to the amended / revised Purchase Order / Contract value and delivery / completion time / schedule, if applicable. (ii)LR / GR date or invoice date (whichever is later) for indigenous supplies and BL /AWB date for FOB / CIF (if applicable) for imported supplies shall be treated as the date of dispatch for levying LD as above. (iii) However, for indigenous supply, if time period between date of receipt of material at site / destination by Site Official & the date of LR / GR or invoice (whichever is later) is more than 30 days, where distance from place of despatch as per LR / GR is upto 1000 Kms or if time period between date of receipt of material at site / destination by Site Official & the date of LR / GR or invoice (whichever is later) is more than 45 days, where distance from place of despatch as per LR / GR is more than 1000 Kms, such excess period shall also be considered for LD purpose. (iv) The supplier shall be duly informed about the deduction of LD along with the details of delays on part of supplier. (iv) If, as per supplier, delay is not attributable to the supplier, delay analysis with documentary evidence may be submitted by the supplier at the earliest but not later than six months from the end of the financial year in which the payment is withheld. Based on the above details / documents submitted by the supplier, BHEL shall take final decision and if considered appropriate by BHEL, withheld amount (full or part as the case may be) shall be released, otherwise, full or balance withheld amount shall be treated as deduction of Liquidated Damages (LD) towards delayed delivery and the specific intimation thereof shall be given to the Supplier immediately via mail or letter or online portal.
11	**Clause No. 17 of GTC**	**TENDER EVALUATION:** Comparative statement shall be prepared and evaluated on total cost basis in INR at destination/site (as per terms of NIT) considering

		overall quantity after considering input credit for GST to BHEL. In respect of price quoted by bidders in currency other than INR, Exchange rate (TT selling rate , State Bank Of India), as applicable on latest date of Tender Opening (I.e extended date as per latest corrigendum for Technical Bids) shall be considered for the purpose of calculation of equivalent INR. If relevant day happens to be a bank holiday, then forex rate as on previous bank (SBI) working day shall be taken for tender evaluation. Total cost for this purpose shall include cost of scope of work as mentioned in NIT along with applicable taxes & duties and other services etc. (if applicable unless otherwise indicated). GST input credit available to BHEL shall be reduced from prices while determining L1 status. **Evaluation in case of more than one L-1 bidders –** In the course of evaluation, if more than one bidder happens to occupy L-1 status, effective L-1 will be decided by soliciting discount from respective L-1. 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.
12	**Clause No. 19 of GTC(Supply Portion) & Clause No 21 of GTC for ETC Portion**	**Arbitration: -** Except as provided elsewhere in this Contract, in case amicable settlement is not reached between the Parties, in respect of any dispute or difference; arising out of the formation, breach, termination, validity or execution of the contract; or, the respective rights and liabilities of the Parties; or, in relation to interpretation of any provision of the contract; or, in relation to interpretation of any provision of the Contract; or, in any manner touching upon the contract, then, either Party may, by a notice in writing to the other Party refer such dispute or difference to the sole arbitration of an arbitrator appointed by Head of the BHEL Unit/Region/Division issuing the Contract. The Arbitrator shall pass a reasoned award and the award of the Arbitrator shall be final and binding upon the Parties.

		Subject as aforesaid, the provisions of Arbitration and Conciliation Act 1996 (India) or statutory modifications or re-enactments thereof and the rules made thereunder and for the time being in force shall apply to the arbitration proceedings under this clause. The seat of arbitration shall be New Delhi. The cost of arbitration shall be borne as per the award of the Arbitrator. Subject to the arbitration in terms of clauses above, the court at New Delhi shall have exclusive jurisdiction over nay matter arising out of or in connection with this Contract. Notwithstanding the existence or any dispute or differences and/or reference for the arbitration, the Contractor shall proceed with and continue without hindrance the performance of its obligations under this contract with due diligence and expedition in a professional manner except where the contract has been terminated by either Party in terms of this contract. **In case of Contract with Public Sector Enterprise (PSE) or a Government Department, the following shall be applicable:** In the event of dispute or difference relating to the interpretation and application of the provisions of commercial contract(s, such dispute or difference shall be referred by either Party for arbitration to the sole arbitrator in the Department of Public Enterprises to be nominated by the Secretary to the Government of India in- charge of the Department of Public Enterprises. The arbitration and Conciliation Act, 1996 shall not be applicable to arbitration under this clause. The award of the arbitrator shall be binding upon the Parties to dispute, provided, however, any Party aggrieved by such award may make further reference for setting aside or revision of the award to the Law Secretary, Department of Legal affairs, Ministry of Law and Justice, Government of India. Upon such reference, the dispute shall be decided by the Law Secretary or the Special Secretary or the Additional Secretary when so authorized by the Law Secretary, whose decision shall bind the Parties hereto finally and conclusively. The Parties to dispute will share equally the cost of arbitration as intimated by the Arbitrator. The clause shall be as per Annexure-IV attached herewith
13	**Clause No. 31 of GTC**	**Clause No 31 as per GTC. However No splitting is applicable for this tender.** UDYAM certificate for MSE suppliers is compulsory and

		supplier should be manufacturer for availing MSE benefit.
14	**Clause No. 33 of GTC**	**Reverse Auction:-** "BHEL shall be resorting to Reverse Auction (RA) (Guidelines as available on www.bhel.com) 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." Abridged Version of "Guidelines for Reverse Auction-2021" may also be seen at BHEL website (www.bhel.com) on "Supplier Registration" Page.
15	**Clause No. 39 of GTC**	**Quantity Variation** – BHEL shall have the right to variation in quantities of items within +/- 20% of the total Purchase Order / Contract value at the time of placement of PO or award of Contract on overall basis for all amendments together within four years from the date of original Purchase Order. The purchaser shall have the right to increase or decrease quantity and scope up to the above extent of value and seller/contractor shall be bound to accept the same at the contracted prices with applicable PV. However, PV shall be applicable for extra quantity for extended period.
16	**Clause No. 40 of GTC**	**STATUTORY VARIATION**: GST rates (Applicable for Indian Bidders) prevailing at the time of dispatch of goods / completion of services shall be payable by BHEL. All other taxes, duties, charges, royalty, cess, other levies shall be deemed to be included in the Ex Works Prices / Charges quoted by bidders and no variations shall be payable in respect thereof. No other variations such as on customs duty, exchange rate, minimum wages, prices of controlled commodities, any other input etc. shall be payable by the BHEL. Notwithstanding anything above, where the actual completion of the supply / services occurs beyond the period stipulated in the Purchase Order / Contract or any extension thereof, variations referred to above, will be limited to the rates prevailing on the dates of such agreed completion periods only. For variations after the agreed completion periods, the Supplier / Contractor alone shall bear the impact for the upward revisions and for downward revisions BHEL shall be given the benefit of reduction in applicable taxes /GST/. This will be without prejudice to the levy of liquidated damages for delay in delivery / completion. If new tax(Applicable for Indian Bidder is introduced by Central/ State Govt / Municipality becomes directly applicable on items specified in Bill of Quantities/Purchase Order/Contract Or If new tax is introduced by Govt /

		Local Municipality etc becomes directly applicable on items specified in Bill of Quantities/Purchase Order/Contract , full reimbursements shall be made provided it becomes applicable on items specified in Bill of Quantities. However, any additional tax implication due to delay in delivery, beyond the Contractual Delivery, attributable to supplier shall be borne by supplier.
17	**Clause no.12 of GTC of Document no. BHEL/ TBG/GTC-ETC/2016 REV 01**	**DEFECT LIABILITY (GUARANTEE SPECIFIC CLAUSE for ETC Portion)** The equipment / material supplied and services rendered (if applicable) shall be guaranteed to be free from all defects and faults in design & engineering, material, workmanship & manufacture and in full conformity with the Purchase Order / Contract, Technical Specifications & approved drawings / data sheets, if any. The defect Liability Period shall be 18 months from the date of Completion of the Facilities or 18 months from the date of last supply, whichever is later. Note: Tentative date of Completion of facilities is Sept'2025. The defective equipment / material / component shall be replaced free of cost at site. Freight & Insurance during transit shall also be in the scope of the supplier / contractor. Any expenditure for dismantling and re-erection of the replaced equipment / material / component shall be to supplier's / contractor's account. All replacements during the guarantee period shall be delivered at site promptly and satisfactorily within a period not more than 45 days (or any other time period informed by BHEL without affecting the project commissioning schedule) from the date of reporting the defect / rejection etc. In the event of the supplier / contractor failing to replace the defective equipment / material / component within the time period mentioned above, BHEL may proceed to undertake the replacement of such defective equipment / material / component at the risk and cost of the supplier / contractor without prejudice to any other rights under the contract and recover the same from PBG / other dues of this Purchase Order / Contract or any other Purchase Order / Contract executed by the supplier / contractor.
18	**Clause No 13 of Document No.:- BHEL/TBG/GTC-ETC/2016/Rev 01**	**TERMS OF PAYMENT: For Erection, Testing & Commissioning (ETC) at Site** TBG is registered with RXIL (TreDS) platform. MSME Bidders are requested to get registered with RXIL (TreDS) platform to avail the facility as per the GOI guidelines. **For Indian Bidder:-** (i)70% of the Contract value with applicable GST (For Indian bidder) against monthly progressive bills on pro-rata basis for completion of erection as certified by BHEL Site Official within within 90 days for non MSE/ 45 days for Micro and Small/ 60 days for Medium from the date of receipt of Tax

		Compliant Invoice (Original +2 Copies) (ii) 20% of the Contract value with applicable GST (For Indian bidder) against monthly progressive bills on pro-rata basis for testing & successful commissioning as certified by BHEL Site Official within 90 days for non MSE/ 45 days for Micro and Small/ 60 days for Medium from the date of receipt of Tax Compliant Invoice (Original +2 Copies) (iii)10% of the Contract value with applicable GST (For Indian bidder) after Acceptance Test, Re-test (if any), PG Test (if any) and Handing Over as certified by BHEL Site Official within 90 days for non MSE/ 45 days for Micro and Small/ 60 days for Medium from the date of receipt of Tax Compliant Invoice (Original +2 Copies). Notes (a) It should be ensured that Tax Invoice complies with statutory requirements under applicable law to enable BHEL to avail Input Tax Credit. If BHEL is unable to avail the input credit of tax paid by vendor due to any fault not attributable to BHEL , the same shall be recoverable from vendor. Note:- The loading, unloading & transportation for the bidder's supplied items from store to Erection site for erection shall be in the scope of bidder. **For other than Indian Bidder:-** (i) 70% of the Contract value with applicable Tax against monthly progressive bills on pro-rata basis for completion of erection as certified by BHEL Site Official within 90 days from the date of receipt of Tax Compliant Invoice (Original +2 Copies) (ii) 20% of the Contract value with applicable TAX against monthly progressive bills on pro-rata basis for testing & successful commissioning as certified by BHEL Site Official within 90 days from the date of receipt of Tax Compliant invoice in 3 sets (original + 2 copies) (iii) 10% of the Contract value with applicable TAX after Acceptance Test, Re-test (if any), PG Test (if any) and Handing Over as certified by BHEL Site Official within 90 days from the date of receipt of Tax Compliant invoice in 3 sets (original + 2 copies) Notes (a) It should be ensured that Tax Invoice complies with statutory requirements under applicable law to enable BHEL to avail Input Tax Credit. If BHEL is unable to avail the input credit of tax paid by vendor due to any fault not attributable to BHEL, the same shall be recoverable from vendor.

		Note:- The loading, unloading & transportation for the bidder's supplied items from store to Erection site for erection shall be in the scope of bidder.
19	**Clause No 18 of Document No.:- BHEL/TBG/GTC-ETC/2016/Rev 01**	Contractor shall be liable for complying with all applicable laws , Rules regulation, meeting statutory obligations etc in India. The Contractor shall pay all taxes , Fees , License Charges , Duties, royalties, commissions or other charges of any nature which may be levied on account of any of his operations connected with Contract, In case BHEL is constrained to make any such payment due to reason attributable to him or any of his subcontractor (if any) , Employees etc , BHEL shall recover the same from the bidder either from moneys due to him or otherwise as deemed fit.
20	**Clause No 42 of Document No.:- BHEL/TBG/GTC/2016/Rev 01**	**CONFIDENTIALITY, USE OF CONTRACT DOCUMENTS AND INFORMATION:-** Bidder shall not, without Company's prior written consent, disclose the contract, or any provision thereof, or any specification, plan, drawing pattern, sample or information furnished by or on behalf of Company in connection therewith, to any person other than a person employed by Bidder in the performance of the contract. Disclosure to any such employed person shall be made in confidence and shall extend only so far, as may be necessary for purposes of such performance. Bidder shall not, without Company's prior written consent, make use of any document or information provided by the Company except for purposes of performing the contract. Any document supplied to the Bidder in relation to the contract other than the Contract itself remain the property of Company and shall be returned (in all copies) to Company on completion of Bidder's performance under the Contract if so required by Company. All information obtained by Bidder in the conduct of operations and the information/drawings/documents provided to the Bidder shall be considered confidential and shall not be divulged by Bidder or its employees to anyone other than the Company's personnel. This obligation of Bidder shall be in force even up to five years after the termination of the contract.
21	**Validity of Offer (Clause no.14 of GTC)**	180 days from the date of opening of techno-commercial bid, unless otherwise specified in the NIT.
22	**Validity of Purchase Order**	4 years from the date of PO with applicable PV.

SPECIAL TERMS & CONDITIONS

(Document No.:- BHEL/TBG/STC /Vishnugad Pipalkoti /CABLE -Rev 00)

Enquiry No:- 92G2400174 dated 15.09.2023
Item: 400kV XLPE Cable & Accessories [Supply + Services]
Project: THDC Vishnugad Pipalkoti Hydro Electric Project (4X111 MW)

23	**No nuclear use**	Products and Services sold by Seller are not intended for use in connection with any nuclear facility or activity, and Buyer warrants that it shall not use or permit others to use Products or Services for such purposes, without the advance written consent of Seller. If, in breach of this, any such use occurs, Seller (and its parent, affiliates, suppliers and subcontractors) disclaims all liability for any nuclear or other damage, injury or contamination, and, in addition to any other rights of Seller, Buyer shall indemnify and hold Seller (and its parent, affiliates, suppliers and subcontractors) harmless against all such liability. Consent of Seller to any such use, if any, will be conditioned upon additional terms and conditions that Seller determines to be acceptable for protection against nuclear liability.
24	**Force Majeure (Clause No.24 of GTC):**	In addition to the content of said clause of GTC, epidemics, pandemics etc. are also included under this clause.
25	**Clause No 20 of Document No.:- BHEL/TBG/GTC-ETC/2016/Rev 01**	**ELECTRICITY & WATER :** Electricity for ETC work shall be provided at one point on chargeable basis. The Contractor shall submit to the BHEL within thirty (30) days from the date of Purchase Order/Work Order whichever is later, his electrical power requirements, if any, to allow the planning of the same by BHEL. The contractor shall have to make his own arrangements for distribution to various locations for their works including proper switches / fuse units, distribution boards, cables, poles etc. to ensure safety of employees, workmen and equipment. If required the contractor shall employ DG Set operated equipment in addition to electrically operated ones to ensure timely completion of work. Contractor shall make all arrangements himself for the supply of construction water as well as potable water for labour and other personnel as the worksite/colony.
26	**Clause No 16 of Document No.:- BHEL/TBG/GTC-ETC/2016/Rev 01**	**FACILITIES TO BE PROVIDED AT SITE BY THE CONTRACTOR :** Watch and ward for the store and safe custody of the equipment / material in the scope of Contractor shall be his responsibility. It is the responsibility of the contractor to dismantle and take away all the material of his office accommodation as soon as the work is handed over to BHEL / Owner and clean the area of debris.
27	**Risk Purchase (Clause No.22 of GTC):**	In case the Supplier / Contractor fails to supply or fails to comply with terms & conditions of the Purchase Order / Contract or delivers equipment / material not of the contracted quality or fails to adhere to the contract specifications or fails to perform as per the activity schedule and there are sufficient reasons even before expiry of the delivery / completion period to justify that supplies shall be

		inordinately delayed beyond contractual delivery / completion period, BHEL reserve the right to cancel the Purchase Order / Contract either in whole or in part thereof without compensation to Supplier / Contractor and if BHEL so desires, may procure such equipment / material / items not delivered, in such manner as deemed proper and appropriate, at the risk and cost of the Supplier / Contractor and the Supplier / Contractor shall be liable to BHEL for any excess cost to BHEL. However, the Supplier / Contractor shall continue execution of the Purchase Order / Contract to the extent not cancelled under the provisions of this clause Recovery amount on account of purchases made by BHEL at the risk and cost of Supplier / Contractor shall be the difference of total value of new Purchase Order (PO) value and total value of old Purchase Order for applicable items, where the total value of new PO is more than total value of old PO for applicable items, plus additional 15% of the total ex-works value of new PO as overheads. The Supplier / Contractor shall on no account be entitled to any gain on such risk & cost purchase. In case the purchase order (PO) value of the new PO is less than the PO value of the old PO, 15% of the total ex-works value of the new PO shall be recovered as overheads and the difference between the PO value of the old PO and the new PO shall not be considered for calculation of the recovery amount.
29	**Confidentiality (Clause No. 42 of GTC):**	Bidders shall have to enter into Non-Disclosure Agreement with BHEL, duly signed with seal in original, if specified in NIT / RFQ failing which bidder's offer shall be liable for rejection.

Following confirmation to be provided by vendor:

"We confirm that we have quoted as per specified price format provided along with this tender".

Note: BHEL reserves the right to cancel this enquiry at any point of time. Bids of only customer approved vendors will be processed.

(Sign and seal of Bidder)

Name
Signature
Stamp

ADDITIONAL TERMS & CONDITIONS

(Document No.:- BHEL/TBG/ATC /VISHNUGAD PIPALKOTI/CABLE -Rev 00)

Enquiry No:- 92G2400174 dated 15.09.2023
Item: 400kV XLPE Cable & Accessories [Supply + Services]
Project: THDC Vishnugad Pipalkoti Hydro Electric Project (4X111 MW)

Additional Terms and conditions

Scope is for supply and services.

Project: THDC Vishnugad Pipalkoti Hydro Electric Project (4X111 MW)

Note:-

1) **This is the Additional Terms & Conditions for the for the procurement of the 400 kV XLPE Cable & Accessories (Supply+ Services) for THDC Vishnugad Pipalkoti Hydro Electric Project (4X111 MW) Project.**

2) **This additional Terms & Conditions to be read in conjunction with the following Documents:-**
   - **i) General Terms and conditions for Tender Enquiry/Contract (Doc. No.:- BHEL/TBG/GTC/2016 REV 01)**
   - **ii) Additional General Terms and conditions for Tender Enquiry/ Contract for Erection Testing & Commissioning (ETC) at Site (Doc. No. BHEL/TBG/GTC-ETC/2016 REV 01)**

ADDITIONAL TERMS & CONDITIONS

(Document No.:- BHEL/TBG/ATC /VISHNUGAD PIPALKOTI/CABLE -Rev 00)

Enquiry No:- 92G2400174 dated 15.09.2023
Item: 400kV XLPE Cable & Accessories [Supply + Services]
Project: THDC Vishnugad Pipalkoti Hydro Electric Project (4X111 MW)

	Additional Terms & Conditions
1	**Project Status** – Non-Mega, Deemed Export benefits are available, however at present, shall be governed by prevalent law.
2	**Type of Tender: - Global.** "For this procurement, the local content to categorize a supplier as a Class I local supplier/ Class II local Supplier/ Nonlocal supplier and purchase preference to Class I local supplier, is as defined in 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". Any Bidder from a country which shares a land border with India will be eligible to bid for this procurement shall be considered only if Bidder is eligible and complies with formalities as mentioned in Office Memorandum dated 23.07.2020 and 24.07.2020.
3	**Pre- Qualification Requirement(PQR):-** **As per Annexure-I** The bidder must ensure that they are meeting the PQR and should submit all the requisite credentials as per PQR
4	**Additional Instructions to the Bidders** i) PRE-BID MEETING: Allowed & shall be within 7-10 days from the date of enquiry/NIT. ii) For Erection, Testing & Commissioning (ETC)-,Price for Services Portion (Item No 2.01 to 2.13 of BOQ) shall be quoted in manner so that Total Price for these items (i.e Item No 2.01 to 2.13) shall not be less than 20% of total ex-works value (Combined Total of Supply+ Services). In case bidder quotes less than 20% total ex-works value (Combined Total of Supply+ Services), then 20% of Total Ex Works value of PO , shall be allocated to the ETC scope. Such Service charges(i.e Item No 2.01 to 2.13 of BOQ) shall be back calculated to keep 20% of Total Ex Works value of PO . This price adjustment shall be done from supply Ex works prices only on prorata basis for all items. For Purpose of above said calculation, Total Ex Works Prices of Supply and ETC Services, If quoted in Currency Other than INR , shall be converted in INR by applying Conversion rate as mentioned in **Point No 05** . In case Total of ETC Services works out less than 20% of Total Ex Works value of PO , Prices shall be back calculated as mentioned above . Further , in Respect of Prices quoted by vendor in currency other than INR , Prices shall be reconverted in Currency quoted by bidder by applying the same conversion rate

BHEL decision in this regards shall be final and Binding on Bidder.

iii) Bidder's offer will be technically acceptable subject to final acceptance of vendor by ultimate customer as approved supplier. Price Bid will be opened only for those bidders in respect of which vendor approval is received from respective customer. Necessary credentials/documents to be submitted to BHEL/ customer for approval.

iv) Export **worthy packing** shall be applicable as per specification. However, bidder to ensure proper packing to avoid any damage & packing of spares should be separated.

v) Transit Insurance policy shall be in Bidder's scope and that should also have a provision of 30 days extended cover at site/ store.

vi) INVOLVEMENT OF REPRESENTATIVE:

Purchase Orders will be placed on successful bidder directly for total supplies and services subject to prior approval by BHEL/end Customer.

In a tender, either the Indian agent on behalf of the Principal/OEM or Principal/OEM itself can submit bid but both cannot submit bid simultaneously for the same item/product in the same tender.

If an agent submits bid on behalf of the Principal/OEM, the same agent shall not submit a bid on behalf of another Principal/OEM in the same tender for the same item/product.

vii) MQP Requirement: As per specification.

viii) BHEL /Customer or both will witness the inspection as per approved QAP.

ix) In case due date has been extended, date of opening of submitted offer shall be considered for purpose of evaluation

x) For supply portion prices are to be quoted by bidder on delivered at place (DAP) basis. Destination address shall be :-
Vishnugad Pipalkoti HEP (4X111 MW) , THDC India Limited , Alaknanda Puram, Pipalkoti , DIstt- Chamoli , Uttarakhand- 246472

xi) Bidder to arrange Freight & Insurance and to bear all costs up to destination. Proof of transit insurance should be submitted along with dispatch documents.

Note:- Transit Insurance policy shall be in Bidder's scope and that should also have a

<table>
<tr><td></td><td>provision of 30 days extended cover at site/ store.
xii) Vendor has to follow the technical specification: Doc No TB-382-316-005 Rev 00</td></tr>
<tr><td>5</td><td>Instructions to the bidder Regarding "Price Bid":-

a) The BOQ -Price bid contains two work sheets named BoQ1 and BoQ2. The applicability of the separate BOQs are as below:-

<table>
<tr><td>Sl No.</td><td>BOQ Work Sheet No.</td><td>Applicability</td></tr>
<tr><td>1</td><td>BoQ1</td><td>Applicable for Indian Bidders Only, who have opted to quote all the items in INR.</td></tr>
<tr><td>2</td><td>BoQ2</td><td>Applicable for Foreign bidders, who have opted to quote all the items in USD</td></tr>
</table>
As regards Total of Prices quoted by bidders as appearing in rows after Item No 2.13 of Price Bid Formats i.e Rows starting with “Total in figures “and “Quoted rate in words “are for Indication /Control Purpose, It is clarified that Evaluation will be made as per Clause regarding Tender Evaluation I,e clause mentioned at Sr No 11 of Special Terms and Conditions (Document No BHEL/TBG/STC/ Vishnugad Pipalkoti /CABLE -Rev 00) .

b) Bidders should quote all items separately as per BOQ. For all Items quoted, Bidder should ensure that Price is quoted for all items in Price Bid (available on NIC Portal) and should mention “Quoted “in Unpriced copy of Price Bid.

(c) Unpriced copy of the Price bid (i.e With all Prices Blanked) Shall be Furnished along with Techno commercial Bid

(d) If No Unit rate is mentioned against any item , It shall be considered as NIL and vendor shall be bound to supply such items/Provide such services at NIL Price

(e) Services in India: - For the Item no.:- 2.01 to 2.13, the services are to be provided in India, GST for these shall be payable extra . Present applicable GST is @ 18% extra is applicable on these Items. Taxes and duties as per Government rules will prevail.

f) Vendor has to quote considering the above points.</td></tr>
<tr><td>6</td><td>Clarifications regarding Taxes & Duties:- Followings may please be noted by the bidders:-

6.1.a) For Supply Portion by Indian Bidders (Item No. 1.01 to 1.20) : -
For Indian Bidder: Price For Supply Portion shall be quoted inclusive of all taxes, duties . Levies, Octroi, all other taxes /duties etc in India except GST in India (In case of Indian</td></tr>
</table>

Bidder) . GST shall be extra in case of Indian bidder.

6.1.b) For supply portion by Foreign Bidder: (Item No. 1.01 to 1.20)
Price For Supply Portion Prices shall be quoted Inclusive of All taxes, duties, levies, Octroi etc.

6.2)**Service portion which are to be provided at India(i.e For ETC Portion): - (Item no. 2.01 to 2.13)**
Price for ETC Charges shall be quoted by Bidder in Indian Rupee (In case of Indianbidder) Price shall be inclusive of all taxes in India Except GST on ETC /Services Portion. However in case of foreign bidder (i.e other than Indian bidders) , prices shall be quoted by bidder in USD.

- **(6.3.a)Payment/ Currency/Billing: For Services**

Payment of Final agreed amount shall be in **INR/USD (US Dollar)** through our e-payment system as per details furnished by the bidder. Bank Charges and/or conversion charges up to payee account will be borne by bidder.

The bidder shall be responsible to pay all other taxes, duties, levies fees, royalty, commission etc. which may be levied on the bidder in executing the contract as per prevalent laws at India and compliance to all local regulations. In case BHEL is forced to pay any of such taxes, it shall be recovered from bidder's bills or otherwise as deemed fit.

All payment shall be released subject to 6.3.b below.
All payment shall be released subject to as per Reserve Bank of India guidelines/Indian Law.

- **(6.3.b)Taxes and Other Duties:- for services in India:-**

- Price quoted should be inclusive of all applicable Taxes/charges but **Excluding GST.**

- **GST on services (i.e On Item No 2.01 to 2.13 of BOQ), shall be payable extra as per followings: -**

a) The bidder is required to get registered with Tax Authorities of India and shall submit to BHEL documentary evidence for such registration.
However ,In case Contract For Services Portion in India awarded to any agency (Refer Point No. 22 below) recommended by Bidder, then such agency shall be required to obtain registration in India.

b) The bidder Or his nominated agency as mentioned in point No 22 below, has to submit TAX compliant invoice as per prevalent laws in India. Any denial of input credit to BHEL or arising of any tax liability on BHEL due to non-compliance of

Tax Laws of India by the bidder in any manner, will be recovered along with liability on account of interest and penalty (if any) from the payments due to the bidder.

c) The bidder may be required to submit documentary evidence for deposit of TAX with tax authorities as per prevalent laws in India.

d) The bidder shall be solely responsible for discharging his statutory liability as per prevalent laws in India and BHEL will not entertain any claim of VAT/Interest/penalty or any other liability on account of failure of bidder in complying the provisions of TAX laws in India or discharging the TAX liability in a manner laid down thereunder.

e) The bidder shall obtain prior written consent of BHEL before billing the amount towards such taxes.

f) TDS / Withholding Tax as applicable as per prevalent Laws in India shall be deducted.

g) If any tax exemptions, reductions, allowances or privileges may be available to the Bidder in the country where the Site is located, BHEL shall use its best endeavors to enable the Bidder to benefit from any such tax savings to the maximum allowable extent. However, in the event of failure on part of the bidder, same shall not be compensated on this account by BHEL.

h) The Bidder shall be solely responsible for the taxes that may be levied on the Bidder's persons or on earnings of any of his employees or any agency nominated by him /sub bidder appointed by him or acts of any of employee/age and shall hold BHEL indemnified and harmless against any claims that may be made against BHEL / Customer. BHEL does not take any responsibility whatsoever regarding taxes under the Income Tax Act, for the Bidder or his personnel. If it is obligatory under the provisions of the Income Tax Act, deduction of Income Tax at source shall be made by the BHEL.

i) The admissibility of GST, taxes and duties referred in this chapter or elsewhere in the contract is limited to direct transactions between BHEL & its Bidder. BHEL shall not be responsible for any liability that may arise due to any transaction beyond the direct transaction between BHEL & its bidder.

j) The bidder/agency nominated by him as per clause No 22 below, should submit its invoices in such a manner enabling BHEL for availment of Input Tax Credit of all the taxes whether included or excluded in the contract price, wherever applicable. Any denial of input credit to BHEL or arising of any tax liability on BHEL due to non-compliance of any Applicable Tax Laws in India by the such agency in any manner, will be recovered along with liability on account of interest and penalty (if any) from the such agency /bidder., Any loss to BHEL on account of any act of such agency shall be recoverable from Bidder.

ADDITIONAL TERMS & CONDITIONS

(Document No.:- BHEL/TBG/ATC /VISHNUGAD PIPALKOTI/CABLE -Rev 00)

Enquiry No:- 92G2400174 dated 15.09.2023
Item: 400kV XLPE Cable & Accessories [Supply + Services]
Project: THDC Vishnugad Pipalkoti Hydro Electric Project (4X111 MW)

7	**Deviation** Technical Deviation: No Technical Deviation is envisaged. Commercial Deviation: No Commercial Deviation envisaged except defined in GTC.
8	**Scope for the unloading of the material / Custom clearance /transportation of the material and delivery of material at the site (Applicable for supply portion only) :-** The material is to be unloaded at the storage area at Project Site. Vishnugad Pipalkoti HEP (4X111 MW) , THDC India Limited , Alaknanda Puram, Pipalkoti , DIstt- Chamoli , Uttarakhand- 246472, India Unloading at the storage area shall be in the scope of the BHEL/BHEL's appointed Agency.
9	**Applicable for Supply Portion only:-** **Consignee Address and The list of documents required from vendor end for the custom clearance by BHEL's appointed agency and Billing Address :-** **Consignee Address :-** General Manager(Projects) Vishnugad Pipalkoti HEP (4X111 MW) , THDC India Limited , Alaknanda Puram, Pipalkoti , DIstt- Chamoli , Uttarakhand- 246472 **Required List of Documents are as below**:- Vendor needs to provide following documents immediately after dispatch. 1. Invoice 2. L.R 3. Packing list. 4. E Way Bill **Bill to Address :-** Bharat Heavy Electricals Limited-TBG, 5th Floor, Plot No.25, Sector-16A, Noida-201301, U.P. GSTN-09AAACB4146P2ZC
10	**Splitting of Contract: -** Splitting of Contract not applicable for this tender.
11	**Make In India (PPP-MII):-** Preference to Make In India products (For bids < 200 Crore):Preference shall be given to Class 1 local supplier as defined in public procurement (Preference to Make in India), Order 2017 as amended from time to time and its subsequent Orders/Notifications issued by concerned Nodal Ministry for specific Goods/Products. If the bidder wants to avail the Purchase preference, the bidder must upload a certificate from the OEM regarding the percentage of the local content and the details of locations at which the local value addition is made along with their bid, failing which no purchase preference shall be granted. In case the bid value is more than Rs 10 Crore, the declaration relating

	to percentage of local content shall be certified by the statutory auditor or cost auditor, if the OEM is a company and by a practicing cost accountant or a chartered accountant for OEMs other than companies as per the Public Procurement (preference to Make-in -India) order 2017 dated 04.06.2020. Class-I, Class-II and non- Local suppliers will be eligible to bid. "Bidder to specify the percentage of local content as per the format of declaration for local content as per Annexure-V".
12	**Compliance to GOI Order for restrictions under Rule 144 (xi) of General Financial Rules (GFRs), 2017:-** Refer Clause at Annexure-VI and Certification at Annexure-VII / Annexure-VIII (whichever is applicable) regarding restrictions under Rule 144 (xi) of General Financial Rules (GFRs), 2017. Bidder to comply the clause and submit the certification. Non-compliance/ Non-submission of certification will lead to rejection of Offer.
13	**MOP Circular:-** Bidder to comply the MOP circular dated 02-07-2020 (Annexure-IX) and its subsequent amendment, if any, in prescribed format (Annexure-X). Non-compliance/ Non-submission will lead to rejection of Offer [Not Applicable for cases where local content is 100%].
14	**Integrity Pact:-** As per Annexure-XI.
15	**Risk and Cost:-** As per Annexure-XII.
16	**Prevention for cartel formation: -** 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.
17	**CUSTOMER APPROVAL:** - Bidder should be approved in THDC and approved bidder to submit their approval letter of THDC, if any, - Bidder who are not approved in THDC, needs to submit complete credential (as mentioned below) along with techno-commercial bid for approval from THDC & placement of order is subject to approval of THDC- - Filled Questionnaire in line with PQR along with supportive documents as- 1. Company profile, 2. ISO certificate, 3. Govt purchase enlistment certificate, 4. Performance certificate for 400 kV Substations, 5. Financial information etc. - Final acceptance of technical qualified vendor for placement of order is subject to approval of THDC. Price bid opening of offers is also subject to vendor approval from THDC. ➢ **Vendor Approval template is enclosed and is to be filled and submitted by vendor**

	along with supporting documents
18	**BHEL Supplier Registration Portal** The link for Online Supplier registration Portal is https://supplier.bhel.in/ .The link for Online Supplier Registration Portal may also be seen at BHEL website (www.bhel.com) on "Supplier Registration" Page**.**
19	**HEALTH, SAFETY AND ENVIRONMENT (HSE) OF BHEL:** BHEL has their own Health, safety and environment. HSE policy is enclosed for bidder's reference.
20	**ADDITIONAL /EXTRA ITEM REQUIRED AT SITE DUE TO DAMAGE REPORTED AT SITE/ THEFT FOR COMPLETION OF PROJECT:** In case of additional requirement of any item specified in BOQ, whether due to damages / theft or any other reason, during contract (i.e. till expiry of contract i.e. end of guarantee period), bidder shall ensure supply of the same at unit Price mentioned in purchase order.
21	**Sub-Contracting.** In case Further Subcontracting of BHEL Purchase Order /work order/contract or part thereof is envisaged by supplier, the same can be done after written permission is obtained. (Refer Clause No 21 of GTC). In addition to clause No 21 of GTC, following shall also be applicable. For any fault /Non Compliance of Law / or due any act of such sub-bidder, Bidder will remain responsible. In case for any reasons, BHEL has to bear any costs/suffer any loss due to act of such subbidder, BHEL shall be entitled to recover the same from Bidder.
22	**Provision for appointing Agency In India for the services/ works at Site** i) The execution of the purchase order (including supplies/services) shall be in the scope of bidder. The bidder shall submit their offer inclusive of all supplies/ services and evaluation shall be based on "Total cost to BHEL" (for details Refer Point no. 5, 6 and other relevant clauses mentioned in this NIT). In case the bidder recommends placement of the order(s) towards portion of the "services in India" on Indian Agency on their behalf, the disclosure of such intent shall be indicated in Offer Itself. The credentials/ capacity / capability of the such Agent to make the services shall be checked by BHEL/customer as per the extant Customer/ BHEL guidelines of the supplier evaluations, Approval & review procedure (SEARP) before opening of the price bid. It will be responsibility of the bidder to get acquainted with the evaluation requirement of Agent as per SEARP available on www.bhel.com. ii) The responsibility for successful execution of the contract (including indigenous supplies/services) lies with the bidder. All Bank guarantees to this effect shall be in the scope of the bidder. iii) Assigning of work of services to such agency shall not absolve the Bidder of

	responsibility of fulfilling obligations contract requirement. It is expressely stipulated that notwithstanding appointment of such ageny, vendor shall remain responsible for performance of all obligations under contract whether in scope of purchase order issued to vendor or work order issued to such agency. **iv)** BHEL may require such additional information /documentary Proof for according approval for such agency arrangement. Decision of BHEL in this regards shall be final and binding on bidder **v)** in case any cost/loss is to be borne by bhel due any act of such agency, bhel shall be entitled to recover the same from OEM/Principal /vendor. OEM /Principal/Vendor shall keep the BHEL Indemnified against any loss/claim against BHEL due to any acts of agency (If any nominated/appointed) as per this clause

Following confirmation to be provided by vendor:

"We confirm that we have quoted as per specified price format provided along with this tender".

Note: BHEL reserves the right to cancel this enquiry at any point of time. Bids of only customer approved vendors will be processed.

(Sign and seal of Bidder)

Name/Signature/Stamp

BHARAT HEAVY ELECTRICALS LTD.
(TRANSMISSION BUSINESS GROUP)

GENERAL TERMS AND CONDITIONS FOR TENDER ENQUIRY / CONTRACT

This is to be submitted duly signed by bidder in original. Clause-wise deviations and / or additional conditions / clarifications, if any, are to be brought out clearly in "Schedule of Commercial Deviation". Deviations and / or additional conditions / clarifications, if any, mentioned elsewhere in the bid / offer, shall not be considered.

Sr. No.	
1.	**INSTRUCTION TO BIDDERS :** 1.1 Sealed bids are invited for the items mentioned in the tender enquiry conforming to the NIT including Technical Specifications. Bids should be typed and free from overwriting and erasures. Corrections or additions / deletions, if any, must be clearly written and attested, otherwise offer may be rejected. 1.2 Bidder must ensure that their bid is submitted / dropped in the tender box on or before **14-00 Hrs.** IST on the due date of opening, unless otherwise specified in the NIT, at the address as follows :- Tender Box, Materials Management, Transmission Business Group, Bharat Heavy Electricals Limited, 5th Floor, Tower-A, Advant Navis IT Business Park, Plot-7, Sector-142, Noida Expressway, Noida, Dist. G. B. Nagar, U. P. ï 201305 1.3 In case tender enquiry is floated though the e-procurement system, offer / bid has to be submitted through the e-procurement system **ONLY** as per instructions given in the e-procurement portal (https://bheleps.buyjunction.in). 1.4 The bids shall be opened at 14-30 Hrs. IST on the due date of opening, in the presence of participating bidders who may like to be present, unless otherwise specified in the NIT. Bids received late are liable for rejection. Bidders sending bids by courier or post will have to ensure that it is timely delivered at the above address. 1.5 Bids are to be submitted duly signed with seal in two parts :- a) **Techno-commercial Bid (Part-I**) ï To be submitted in 2 sets (original + copy). A copy of Price Bid (Part-II) clearly mentioning all the necessary information as per format **without prices** ñUn-Priced Bidò is also to be enclosed in Part-I Bid. b) **Price Bid (Part-II)** ï To be submitted only in one set in a separate sealed envelope. This should not contain any Technical and / or Commercial Terms and Conditions. The rates should be quoted both in figures and words. 1.6 The Part-I and Part-II Bids are to be sealed in separate envelopes and marked

Sr. No.	
	as ñTechno-commercial Bid (Part-I)ò and ñPrice Bid (Part-II)ò respectively. Both the envelopes are to be kept in another common envelope and marked as ñBIDò. Each envelope should be sealed and super scribed with tender enquiry no., item / package name, project name and due date of opening. Bidderôs name and address shall also be mentioned on each envelope. 1.7 For any technical clarification, please contact official mentioned in the tender enquiry / NIT. 1.8 For any commercial clarification please contact official issuing tender enquiry / NIT. 1.9 Price bid (Part-II) should not contain any additional information / description other than given in ñUn-Priced Bidò submitted with ñTechno-commercial Bid (Part-I)ò except prices, otherwise bid is liable for rejection. 1.10 Price Bid submitted along with the bid shall remain valid up to validity of offer. Any discount / revised offer submitted by the bidder on its own shall be accepted provided it is received before the due date and time of offer submission (i.e. Part-I Bid). The discount shall be applied on pro-rata basis to all items including optional items, if any, unless specified otherwise by the bidder. Discount offered shall be valid for full duration of validity of the offer including extension of validity, if any. Unsolicited Supplementary / Revised Price Bid submitted after the due date and time of offer submission (i.e. Part-I Bid), during validity period of offer, unless asked by BHEL, shall not be considered. Withdrawal of quotation by the bidder, at any stage after its opening, may entail suitable action against such bidder by BHEL. 1.11 The consultants / firm (and any of its affiliates) shall not be eligible to participate against tender enquiry for the related goods or works or services for the same project, if they were engaged by BHEL-TBG for the consultancy services. 1.12 In case any Foreign OEM / Foreign Principal insists on engaging the services of an agent, such agent shall not be allowed to represent more than one manufacturer / supplier in the same tender. Moreover, either the agent could bid on behalf of the manufacturer / supplier or the manufacturer / supplier could bid directly but not both. In case bids are received from the manufacturer / supplier and the agent, bid received from the agent shall be ignored. 1.13 Non-conformities / errors / discrepancies in quoted prices in price bids shall be dealt as follows :- a) If, in the price structure quoted for the required goods / services / works, there is discrepancy between the unit price and the total price (which is obtained by multiplying the unit price by the quantity), the unit price shall prevail and the total price corrected accordingly, unless in the opinion of BHEL there is an obvious misplacement of the decimal point in the unit price, in which case the total price as quoted shall govern and the unit price corrected accordingly. b) If there is an error in a total corresponding to the addition or subtraction of subtotals, the subtotals shall prevail and the total shall be corrected. c) If there is a discrepancy between words and figures, the amount in

Sr. No.	
	words shall prevail, unless the amount expressed in words is related to an arithmetic error, in which case the amount in figures shall prevail subject to (a) and (b) above. d) If there is such discrepancy in an offer as mentioned in (a), (b) & (c) above, the same shall be conveyed to the bidder with target date upto which the bidder has to send his acceptance on the above lines and if the bidder does not agree to the decision of the BHEL, the bid is liable to be ignored. 1.14 In case the scope of the successful bidder / supplier against this tender enquiry includes Erection, Testing and Commissioning (ETC) of the equipment / material at site in addition to Supply, Purchase Order shall be placed for Supply Portion and Contract shall be separately awarded for ETC at Site Portion. General Terms and Conditions for Tender Enquiry / Contract mentioned herein shall be applicable for both Supply & ETC at Site. Additional Terms and Conditions for Tender Enquiry / Contract for Erection, Testing and Commissioning at Site ñBHEL/TBG/GTC-ETC/2016 Rev. 01ò shall be applicable for ETC at Site only which is to be read in conjunction with General Terms and Conditions for Tender Enquiry / Contract mentioned herein. However, any breach of either the Purchase Order or the Contract shall be deemed to be breach of the other. 1.15 Taxes and Duties payable extra as per Clause No. 2.3 in NIT, if not specified/quoted clearly as extra shall be considered as included in Ex-works Price and therefore shall not be reimbursed. Taxes and duties not payable extra as per NIT shall be deemed to be included in Ex-works Price. 1.16 If the rates for taxes and duties in respect of the quoted materials and / or services assumed by the Supplier are less than the tariff prevailing at the time of tendering, Supplier will be responsible for such under quotations. However if the rates assumed are higher than the correct rates prevailing at the time tendering, the difference will be to the credit of BHEL. Note : Representative / official deputed by the bidder to witness tender opening must produce authorization letter for the same.
2.	**PRICES :** 2.1 Unless specifically indicated in the NIT, all prices shall be FIRM. No enhancement of rate for whatsoever reasons unless and until asked by BHEL shall be allowed. 2.2 Unless specifically indicated in the NIT, the prices shall be on INR basis. 2.3 Unless specifically indicated in the NIT, the prices are to be quoted on FOR (Site / Destination) basis excluding GST. The break-up of prices shall be as under :- a) **Ex-works Price**: Ex-works price including packing & forwarding charges. b) **Freight**: Freight for door delivery up to destination / site / store are to be quoted separately. c) **Insurance**: Insurance for door delivery up to destination / site / store are to be quoted separately.

Sr. No.	
	d) **Type Test Charges**: If asked in the technical specification, it is to be quoted separately for each test. e) **Charges for Supervision of Erection, Testing & Commissioning (ETC) at Site**: To be quoted separately if specified in NIT/Price Schedule. f) **Charges for Testing & Commissioning at Site**: To be quoted separately if specified in NIT/Price Schedule. g) **Charges for Erection, Testing & Commissioning at Site**: To be quoted separately if specified in NIT/Price Schedule. h) Training Charges: To be quoted separately if specified in NIT/Price Schedule. 2.4 **GST rates** along with HSN/SAC code as applicable on Sr No (a) to (h) above is to be mentioned separately in percentage in both un-priced bid and price bid. Note : i) Unless otherwise specified in the NIT, the purchase order shall be placed on Ex-works basis for Indian bidders. ii) Prices quoted by Indian bidders shall be in Indian Rupees only. iii) In case Supervision of Erection, Testing & Commissioning (ETC) at Site or Testing & Commissioning at Site or Erection, Testing & Commissioning at Site is also in scope of the bidder along with supply, bidder has to ensure that prices quoted for such services also are in line with special terms & conditions of the NIT, if any. iv) Unless otherwise specified in the NIT, Unloading at Site / Destination shall not be in the scope of the supplier. v) Prices in respect of Sr No (a) to Sr No (h) of Clause 2.3 above are to be quoted inclusive of all taxes & Duties, charges. Levies, royalty etc. if any, excluding GST.
3.	**TERMS OF PAYMENT :** 3.1 **For Supply only in scope of the supplier** 100% of payment within 60 days from the date of receipt of complete invoice along with documents in 3 sets (original + 2 copies) as follows : · LR / GR duly endorsed by BHEL Site Official. · Material Receipt Certificate issued by BHEL Site Official. . GST Compliant Tax Invoice · Packing List (Case-wise) · Copy of Transit Insurance Certificate from underwriters. · Material Inspection Clearance Certificate (MICC) issued by BHEL Quality Management · Guarantee Certificate · Copy of Performance Bank Guarantee (PBG) · Certificate of acceptance of Type Test Reports issued by BHEL Engineering Management wherever specifically mentioned in the Purchase Order. 3.2 **For Supply where Supervision of Erection, Testing & Commissioning (ETC) at Site is in scope of the supplier or Supply where Testing & Commissioning at Site is in scope of the supplier**

Sr. No.	
	a) 95% of payment within 60 days from the date of receipt of complete invoice along with documents in 3 sets (original + 2 copies) as follows : · LR / GR duly endorsed by BHEL Site Official. · Material Receipt Certificate issued by BHEL Site Official. . GST Compliant Tax Invoice · Packing List (Case-wise) · Copy of Transit Insurance Certificate from underwriters. · Material Inspection Clearance Certificate (MICC) issued by BHEL Quality Management · Guarantee Certificate · Copy of Performance Bank Guarantee (PBG) · Certificate of acceptance of Type Test Reports issued by BHEL Engineering Management wherever specifically mentioned in the Purchase Order. b) 5% of payment within 60 days from the date of receipt of complete invoice along with documents in 3 sets (original + 2 copies) as follows : · Certificate of successful completion of Supervision of Erection, Testing & Commissioning at Site if it is in the scope of the supplier or Certificate of successful completion of Testing & Commissioning at Site if it is in the scope of the supplier. · Certificate of completion of final documentation as per Purchase Order / Technical Specification issued by BHEL Engineering Management 3.3 **For Supply where Erection, Testing & Commissioning (ETC) at Site is in scope of the supplier** a) 90% of payment within 60 days from the date of receipt of complete invoice along with documents in 3 sets (original + 2 copies) as follows : · LR / GR duly endorsed by BHEL Site Official. · Material Receipt Certificate issued by BHEL Site Official. · GST Compliant Tax Invoice · Packing List (Case-wise) · Copy of Transit Insurance Certificate from underwriters. · Material Inspection Clearance Certificate (MICC) issued by BHEL Quality Management · Guarantee Certificate · Copy of Performance Bank Guarantee (PBG) · Certificate of acceptance of Type Test Reports issued by BHEL Engineering Management wherever specifically mentioned in the Purchase Order b) 10% of payment within 60 days from the date of receipt of complete invoice along with documents in 3 sets (original + 2 copies) as follows : · Certificate of successful completion of Erection, Testing & Commissioning at Site issued by BHEL Site Official / Construction Management · Certificate of completion of final documentation as per Purchase Order / Technical Specification issued by BHEL Engineering Management 3.4 For Type Test Charges 100% payment along with applicable GST within 60 days from the date of receipt of complete GST compliant Tax invoice along with copy of Certificate of acceptance of Type Test Reports issued by BHEL Engineering Management in 3 sets (original + 2 copies) on completion of delivery (at site, if F&I is in scope of

Sr. No.	
	supplier) of main supplies (excluding spares) for which Type Tests are applicable. List of main supplies (excluding spares) for which Type Tests are applicable shall be certified by BHEL Engineering Management. 3.5 For Charges for Supervision of Erection, Testing & Commissioning at Site 100% payment along with applicable GST within 60 days from the date of receipt of complete GST compliant Tax invoice along with certificate of successful completion of Supervision of Erection, Testing & Commissioning at Site issued by BHEL Site Official / Construction Management in 3 sets (Original + 2 copies). 3.6 For Charges for Testing & Commissioning at Site 100% payment along with applicable GST within 60 days from the date of receipt of complete GST compliant Tax invoice along with certificate of successful completion of Testing & Commissioning at Site issued by BHEL Site Official / Construction Management in 3 sets (Original + 2 copies). 3.7 For Training Charges 100% payment along with applicable GST within 60 days from the date of receipt of complete GST compliant Tax invoice along with certificate of completion of training issued by BHEL Engineering Management in 3 sets (original + 2 copies). Note : i) Supplier has to submit invoice(s) as per PO or approved billing break-up of prices (if applicable as per NIT). ii) In case of supplies for overseas project, Material Receipt Certificate issued by BHEL Authorized Representative shall also be acceptable. iii) In case of Transit Insurance under Open Insurance Policy, Intimation / Declaration of Transit Insurance as per terms of the relevant Open Insurance Policy along with copy of Open Insurance Policy from underwriters shall also be acceptable. iv) Supplier has to ensure commencement of transit insurance from the date not later than LR / GR date. v) Supplier has to submit Tax Invoice(s). Supplier should ensure that Tax Invoice should comply all statutory requirements under GST Law to enable BHEL to avail input credit vi) MSMED Act, 2006 and the rules made thereunder as amended from time to time shall be applicable for release of payment to suppliers qualified & registered as Micro & Small Enterprises based on documents mentioned in the NIT for MSME. vii) Supplier has to submit PBG (as per BHEL format) & Guarantee Certificate as per PO terms. viii) In case any shortages and / or damages in supplies, an amount calculated

Sr. No.	
	based on comments against Material Receipt Certificate issued by the BHEL Site Official shall be withheld from the supply payment against 3.1(a) or 3.2(a) above to be deemed fit by BHEL subject to a minimum of 10% of the total ex-works value of the invoice corresponding to the LR / GR against which any shortages and / or damages are reported. The withheld amount shall be released after the shortages and / or damages in supplies are supplied / replenished against Certification by BHEL Site Official. ix) Payment of GST component shall be made only if vendor has deposited the Tax and credit for the same is reflected in GSTN (GST Network). In case credit of the same is not reflected in GSTN , vendor may alternatively furnish BG of GST Amount for a period valid for not less than 1 month .In case of disallowance of credit /non reflection of credit in GSTN , amount will be recovered from supplier along with applicable Interest , penalty etc from any of his dues. x) If GST is payable by BHEL on reverse Charge Mechanism basis, vendor should ensure the submission of GST compliant Tax invoice immediately on dispatch/ performance of service. In case of non-compliance any additional charges towards interest, penalty etc, will be to vendors account. xi) TDS under GST Act, if applicable, shall be deducted unless Exemption Certificate If applicable, from the appropriate authority is furnished to BHEL along with Invoice.
4.	**INTEREST LIABILITY :** In case of any delay in payment due to any reason, BHEL shall not pay any interest on delayed payment. Also, no interest shall be payable by BHEL on the bank guarantee / deposit amount or balance payment or any other money which may become due owing to difference or misunderstanding or any dispute before any quasi judicial authority between BHEL and the Supplier / Contractor.
5.	**GUARANTEE :** The equipment / material supplied and services rendered (if applicable) shall be guaranteed to be free from all defects and faults in design & engineering, material, workmanship & manufacture and in full conformity with the Purchase Order / Contract, Technical Specifications & approved drawings / data sheets, if any, for 18 months from the date of last delivery or 12 months from the date of commissioning, whichever is earlier. Wherever Erection, Testing & Commissioning at Site are also in the scope of the Supplier, the guarantee period shall be 18 months from the date of last delivery or 12 months from the date of commissioning, whichever is later. The defective equipment / material / component shall be replaced free of cost at site. Freight & Insurance during transit shall also be in the scope of the supplier / contractor. Any expenditure for dismantling and re-erection of the replaced equipment / material / component shall be to supplier's / contractor's account. All replacements during the guarantee period shall be delivered at site promptly and satisfactorily within a period not more than 45 days from the date of reporting the defect / rejection etc. In the event of the supplier / contractor failing to replace the defective equipment / material / component within the time period mentioned above, BHEL may proceed to undertake the replacement of such defective equipment / material / component at the risk and cost of the supplier / contractor without prejudice to any other rights under the contract and recover the same from PBG / other dues of this Purchase

Sr. No.	
	Order / Contract or any other Purchase Order / Contract executed by the supplier / contractor. Note : i) In case of Illumination System, items viz. Lamps, Tubes, Ballast, Starters, Capacitors & Fuses will not be under Guarantee after commissioning. ii) In addition to the above guarantee period, Extended Guarantee / Warranty, if any, shall be as per NIT / Technical Specifications. iii) In case offer of agent of Foreign OEM / Foreign Principal is considered, as per Clause No. 1.12 above, Guarantee as mentioned above has to be provided by the Foreign OEM / Foreign Principal also.
6.	**LATENT DEFECT :** Liability for latent defects shall be for defects inherently lying within material or arising out of design deficiency which does not manifest itself during guarantee period but later and shall be limited to five years from the expiry of the guarantee period.
7.	**PERFORMANCE BANK GUARANTEE (PBG) :** Supplier shall arrange to submit Performance BG / Deposit on a non-judicial stamp paper of appropriate value along with first invoice or within 60 days from placement of Purchase Order (PO) whichever is earlier, in line with one of the applicable options as follows :- Option ñAò A single rolling PBG for Rs. 50 Lakhs initially valid for 18 months with claim period of 3 months extra over and above 18 months for all the Purchase Orders being executed for Transmission Business Group, BHEL. However, validity of the PBG shall be extended till 18 months from the date of last delivery with 3 months claim period extra over and above 18 months. Single Rolling PBG option shall not be applicable in case Ex-works value of the PO at the time of placement of PO exceeds Rs. One Crore. Option ñBò PBG for 10% of the total Ex-works PO value, valid for 18 months from the date of last delivery with claim period of 3 months extra over and above 18 months. Ex-works PO value at the time of placement of PO shall be considered for calculation of the PBG amount. Option ñCò In case the total Ex-works PO value at the time of placement of PO does not exceed Rs. Ten Lakhs, interest free Deposit of 10% of the total Ex-works PO value at the time of placement of PO in form of Demand Draft favouring ñBharat Heavy Electricals Limitedò and payable at New Delhi / Delhi / Noida shall also be acceptable to BHEL in lieu of PBG, which shall be released after expiry of 21 months from the date of last delivery after deduction, if any, within 60 days from receipt of invoice in 3 sets (original + 2 copies) to be submitted by the supplier. Note : i) The Bank Guarantee shall be from any bank as per Annexure for List of Banks (32 Nos.). The original PBG should be sent by issuing Bank directly to AGM (Finance), TBG, BHEL, Noida. ii) Extension of validity of the PBG in original, as per above clause, should be sent by issuing Bank directly to AGM (Finance), TBG, BHEL, Noida at least 45 days before expiry of validity of the PBG. iii) Unless otherwise specified in the NIT, deviation taken for non-submission of PBG / Deposit, as applicable, shall not be accepted.

Sr. No.	
	iv) Supplier has to confirm one of the applicable options for submission of PBG / Deposit before placement of PO. v) In case of nonï submission PBG / Deposit, as applicable, BHEL reserve the right for Risk Purchase as per terms of the NIT and impose Suspension of Business Dealings with the Supplier / Contractor. vi) BHEL reserve the right to encash the Bank Guarantee and forfeit the amount in the event of any default, failure or neglect on part of the Supplier in fulfilment of performance of the Purchase Order. vii) Value of the Bank Guarantee (at the time of submission) shall remain unchanged for any subsequent variations in Purchase Order value up to ± 20%. Beyond this variation of ± 20%, the Supplier shall arrange to enhance or may reduce the value of the Bank Guarantee accordingly for the total variation promptly. viii) Vendor to ensure submission of Certificate of Final Documentation /Confirmation regarding Non applicability of Final Documentation, as the case may be, as referred in clause No 9 regarding Final Documentation. BG shall be released only after submission of the same to BHEL TBMM.
8.	**SUBMISSION OF DRAWINGS / DOCUMENTS FOR APPROVAL :** Supplier shall submit the master document list within 7 days from date of Purchase Order / Contract, unless otherwise specified in the NIT, with planned dates for submission which shall be in line with activity schedule as per Purchase Order / Contract and shall be finalized with BHEL Engineering Management. Date of first submission of drawings / documents shall be certified by BHEL Engineering Management after the receipt of applicable drawings / documents (e.g. project specific cover sheet, GTP, OGA drawings, schemes, type test reports etc.) by BHEL. During detailed engineering stage, necessary hard copies of the engineering drawings / documents shall also be submitted by the supplier as per the Purchase Order / Contract requirement. The supplier shall also submit the packing drawings as per technical specifications. In case item(s) offered require any interface details of other item (not in the scope of supplier & required for operating the equipment), the supplier has to submit interfaces schedule along with submission of engineering drawings / documents. It shall be responsibility of the supplier to get the details of the interfaced item from BHEL before manufacturing to avoid any mismatch at site.
9.	**FINAL DOCUMENTATION :** Final documentation as called in the Technical /contract specification is to be submitted within 3 months from the date of first delivery of respective equipment, item/material. After submission of Final Documentation, BHEL Engineering Management (TBEM) will issue a Certificate of Completion of Final Documentation. Wherever Final Documentation is not applicable, BHEL Engineering Management (TBEM) will issue confirmation regarding the same, Vendor to submit the Certificate of Final Documentation /Confirmation regarding Non applicability of Final Documentation, as the case may be, to BHEL TBMM. In case of Non Submission of Certificate of Final Documentation /Confirmation regarding Non applicability of Final Documentation, BG will be liable for encashment.
10.	**INSPECTION :** BHEL / customer / third party shall inspect equipment / material before despatch. Stage inspection during manufacturing may also be carried out. Material to be despatched only after getting Material Despatch Clearance Certificate (MDCC) / MICC issued by BHEL. Supplier shall send inspection call on prescribed format / web site only, with an advance notice of 15 days. Supplier to ensure submission of all routine / acceptance test reports, inspection

Sr. No.	
	reports and all other documents related to inspection, immediately to BHEL. BHEL representative is authorised to carry out audits along with Third Party Inspection Agency at vendorâs / supplierâs works before clearing the items for despatch.
11.	**DESPATCH DOCUMENTS :** Despatch documents to be immediately sent to BHEL on despatch are as follows :- • Copy of Invoice • Copy of LR / GR in case of Indian suppliers or BL / AWB in case of foreign suppliers • Copy of Packing List (Case-wise) • Copy of Transit Insurance Certificate from underwriters • Copy of Guarantee Certificate
12.	**DELIVERY PERIOD :** Delivery / Completion requirement shall be mentioned in the NIT. Bidder to specify best delivery / completion period possible in weeks from the date of LOI / PO as per activity schedule for consideration by BHEL. Time required for type test, if applicable, is to be separately indicated. Note : LR / GR date or invoice date (whichever is later) for indigenous supplies and BL / AWB date for FOB / CIF (if applicable) contracts shall be considered as delivery date.
13.	**LIQUIDATED DAMAGES FOR DELAYED DELIVERY**: In case of delay in execution of Purchase Order beyond the contractual delivery time, an amount of 0.5% of the total Purchase Order value for supply (incl. taxes and duties, freight & insurance as applicable) per week of delay or part thereof subject to a maximum of 10% of the total Purchase Order value for supply (incl. taxes and duties, freight & insurance as applicable) shall be deducted as Liquidated Damages (LD) along with applicable GST (if any) on LD. However, in case of staggered (lot-wise) contractual delivery schedule, an amount of 0.5% of the total Purchase Order value for supply (incl. taxes, duties, freight & insurance as applicable) of delayed lot per week of delay or part thereof subject to maximum of 10% of the total Purchase Order value. (Incl taxes, duties, Freight &Insurance as applicable) shall be deducted as Liquidated Damages (LD) along with applicable GST (if any) on LD. Note : i) In case of any amendment / revision in PO /WO, the LD shall be linked to the amended / revised Purchase Order / Contract value and delivery / completion time / schedule, if applicable. ii) LR / GR date or invoice date (whichever is later) for indigenous supplies and BL / AWB date for FOB / CIF (if applicable) for imported supplies shall be treated as the date of dispatch for levying LD as above. iii) However, for indigenous supply, if time period between date of receipt of material at site / destination by Site Official & the date of LR / GR or invoice (whichever is later) is more than 30 days, where distance from place of despatch as per LR / GR is upto 1000 Kms or if time period between date of receipt of material at site / destination by Site Official & the date of LR / GR or invoice (whichever is later) is more than 45 days, where distance from place of despatch as per LR / GR is more than 1000 Kms, such excess period shall also be considered for LD purpose. iv) If, as per supplier, delay is not attributable to the supplier, delay analysis with documentary evidence may be submitted by the supplier at the earliest but not

Sr. No.	
	later than six months from the end of the financial year in which the payment is withheld. Based on the above details / documents submitted by the supplier, BHEL shall take final decision and if considered appropriate by BHEL, withheld amount (full or part as the case may be) shall be released, otherwise, full or balance withheld amount shall be treated as deduction of Liquidated Damages (LD) towards delayed delivery.
14.	**VALIDITY OF OFFER :** The offer shall be valid for 120 days from the due date of opening of tender (i.e. techno-commercial bid unless otherwise specified in the NIT). Prices of Spares, wherever they optional items, shall be valid till two years from the date of placement of PO.
15.	**ACCEPTANCE / REJECTION OF TENDER :** BHEL reserve the right to reject in full or part, any or all tender without assigning any reason thereof. BHEL also reserve right to vary the quantities as mentioned in the NIT. Acceptance of offer is subject to vendor approval by customer before opening of price bid. BHEL shall not be bound by any power of attorney granted by tenderer or by changes in composition of the firm made subsequent to award of order / contract. BHEL may however recognize such power of attorney and changes after obtaining proper legal advice, cost of which will be chargeable to the seller / contractor concerned. If the tenderer deliberately gives wrong information, BHEL reserves the right to reject such an offer at any stage or cancel the order / contract, if awarded, and forfeit the security deposit and bank guarantee.
16.	**DEVIATION :** The bids having deviation(s) w.r.t. tender are liable for rejection. However, BHEL, at its discretion, may load the prices for evaluation of offer with prior intimation to bidder.
17.	**TENDER EVALUATION :** Comparative statement shall be prepared and evaluated on total cost basis at destination/site (as per terms of NIT) considering overall quantity indicated in NIT unless contrary to same is specifically mentioned in the tender enquiry / NIT. Total cost for this purpose shall include cost of scope of work as mentioned in NIT along with applicable taxes & duties, and other services etc. (if applicable). GST input credit available to BHEL shall be reduced from prices while determining L1 status. In case all bidders are foreign & Port of Import (destination port) is same for all the bidders, evaluation of offers shall be done on CIF (Port of Import) basis. Otherwise, evaluation of offers shall be done on the basis of delivered cost at site /destination to BHEL. Further, in case of foreign bidders, marine freight & insurance are to be quoted separately & the purchase order may be placed on FOB basis with an option for delivery on CIF / CFR basis, if required, later. In case of foreign bidders, Exchange Rate (TT selling rate of State Bank of India) as on date of tender opening (Part-I Bid in case of two part bid) shall be considered. If the relevant day happens to be a bank holiday, then the forex rate as on the previous bank (SBI) working day shall be taken for tender evaluation.
18.	**LOADING CRITERIA :** List of permissible deviations & loading criteria thereof are as follows :- a) Payment Terms Base rate of SBI (as applicable on the date of bid opening / techno-commercial bid opening in case of two part bids) + 6% shall be considered for loading for the period of relaxation sought by bidder(s) against terms of payment in the NIT. b) Liquidated Damages (LD) for Delayed Delivery

Sr. No.	
	Loading on LD clause shall be to the extent to which it is not agreed to by the bidder (at offered value). c) In case of foreign bidders, if the quoted prices is on CIF basis only, it shall be loaded to arrive at total FOR (Site / Destination) price, as applicable, by factors as follows :- i) Port handling / clearing charges: @ 1% of CIF value to arrive at Customs Assessable Value. ii) Custom Duty (including CVD & SAD) as per NIT prevailing on date of price bid opening. iii) Inland Freight & Transit Insurance: @ 5% of CIF value where distance between site / destination and Port of Discharge is upto 1000 Kms or @ 7% of CIF value where distance between site / destination and Port of Discharge is more than 1000 Kms. Note : Additional deviations (if considered acceptable by BHEL) & the loading criteria shall be communicated to all the qualified bidders before price bid opening.
19.	**ARBITRATION :** In the event of any dispute emanating from and relating to this contract, the matter shall be referred to the sole arbitration of the person appointed by the competent authority of BHEL. Subject to aforesaid, the provisions of ñThe Arbitration and Conciliation Act, 1996ò and the rules made thereunder as amended from time to time in India shall apply to the arbitration proceedings. The venue of arbitration shall be in New Delhi. Further there shall be no claim for any pre-reference or pendente-lite interest on the claims and any claim for such interest made shall be void. However, in case of contract with Public Sector Enterprise / Undertaking (PSE/PSU) or Govt. Dept., the extant guidelines of Govt. of India shall be followed.
20.	**LEGAL SETTLEMENT :** Indian Courts at New Delhi / Delhi shall have exclusive jurisdiction to decide the dispute, if any, arising out of or in respect of the contract(s) to which these conditions are applicable. Contract, including all matters connected with contract, shall be governed by the Indian Law, both substantive and procedural, for the time being in force including modification thereto.
21.	**SUB-CONTRACTING :** In case further subcontracting of BHEL Purchase Order / Contract or part thereof is envisaged by supplier, the same can be done after written permission is obtained from BHEL. However it shall not absolve the Supplier / Contractor of the responsibility of fulfilling BHEL Purchase Order / Contract requirements. In case of subcontracting of Purchase Order / Contract awarded by BHEL or part thereof without such permission, BHEL reserve the right to cancel the Purchase Order / Contract and source such material / component / equipment / system from any other agency at the risk and cost of the Supplier / Contractor. If Supplier / Contractor is an individual or proprietary concern and the individual or the proprietor dies or the partnership is dissolved or substantially affected, then unless BHEL is satisfied that legal representative of individual Supplier / Contractor or proprietor of proprietary concern and surviving partners of partnership firm are capable of carrying out and completing the Purchase Order / Contract, BHEL shall be entitled to cancel the Purchase Order / Contract as to its incomplete portion and without being in any way liable to payment of any compensation to legal representative of Supplier / Contractor and / or to surviving partners of Supplierôs / Contractorôs firm on account of cancellation of the Purchase Order / Contract. Decision of BHEL that legal representatives of deceased Supplier / Contractor or

Sr. No.	
	surviving partners of the Supplier's / Contractor's firm cannot carry out and complete the Purchase Order / Contract shall be final and binding on the parties hereto. Terms and Conditions shall not get affected in case of de-merger / amalgamation / taking-over / re-constitution etc.
22.	**RISK PURCHASE :** In case the Supplier / Contractor fails to supply or fails to comply with terms & conditions of the Purchase Order / Contract or delivers equipment / material not of the contracted quality or fails to adhere to the contract specifications or fails to perform as per the activity schedule and there are sufficient reasons even before expiry of the delivery / completion period to justify that supplies shall be inordinately delayed beyond contractual delivery / completion period, BHEL reserve the right to cancel the Purchase Order / Contract either in whole or in part thereof without compensation to Supplier / Contractor and if BHEL so desires, may procure such equipment / material / items not delivered or others of similar description where equipment / material / items exactly complying with particulars are not readily procurable in the opinion of BHEL which is final and in such manner as deemed appropriate, at the risk and cost of the Supplier / Contractor and the Supplier / Contractor shall be liable to BHEL for any excess cost to BHEL. However, the Supplier / Contractor shall continue execution of the Purchase Order / Contract to the extent not cancelled under the provisions of this clause. Recovery amount on account of purchases made by BHEL at the risk and cost of Supplier / Contractor shall be the difference of total value of new Purchase Order (PO) value and total value of old Purchase Order for applicable items, where the total value of new PO is more than total value of old PO for applicable items, plus additional 15% of the total ex-works value of new PO as overheads. The Supplier / Contractor shall on no account be entitled to any gain on such risk & cost purchase. In case the purchase order (PO) value of the new PO is less than the PO value of the old PO, 15% of the total ex-works value of the new PO shall be recovered as overheads and the difference between the PO value of the old PO and the new PO shall not be considered for calculation of the recovery amount.
23.	**ADJUSTMENT OF RECOVERY :** Any amount payable by the Supplier / Contractor under any of the condition of this contract shall be liable to be adjusted against any amount payable to the Supplier / Contractor under any other Purchase Order / Contract awarded to him by any BHEL unit. This is without prejudice to any other action, as may be deemed fit, by BHEL.
24.	**FORCE MAJEURE CONDITION :** If by reason of war, civil commotion, act of god, Government restrictions, strike, lockout which are not in control of Supplier / Contractor the deliveries / services are delayed, Supplier / Contractor shall not be held responsible. If at any time during the continuance of the Purchase Order / Contract, the performance in whole or in part by either party of any obligations under the Purchase Order / Contract is prevented or delayed by reason of any war hostilities, acts of the public enemy, restrictions by Govt. of India, civil commotion, sabotage, fires, floods, explosion, epidemics, quarantine restrictions, strike, lock-outs or acts of God (hereinafter referred to as "event"), which are not in control of Supplier / Contractor or BHEL, then provided notice of the happening of such event is given by either party to the other within fifteen (15) days from the date of occurrence thereof, neither party shall by reason of such event be entitled to terminate the Purchase Order / Contract nor shall have any claim for damages against each other in respect of such non-performance and delay in performance. Performance under the Purchase Order / Contract shall be resumed immediately after such event has come to an end or

Sr. No.	
	ceased to exist and decision of BHEL as to whether the deliveries have to be resumed or not shall be final, conclusive and binding on the parties hereto. In the event of the parties hereto not able to agree that a force majeure event has occurred, the parties shall submit the disputes for resolution pursuant to the provisions hereunder, provided that the burden of proof as to whether a force majeure event has occurred shall be upon the party claiming such an event. Notwithstanding above provisions, BHEL shall reserve the right to cancel the Purchase Order / Contract, wholly or partly, in order to meet the overall project schedule and make alternative arrangements for completion of delivery and other schedules.
25.	**MANUFACTURING QUALITY PLAN (MQP) :** Supplier to submit approved MQP in line with requirement of BHEL/customer.
26.	**SUPPLIER PERFORMANCE MONITORING AND RATING SYSTEM :** BHEL reserve the right for evaluation of Supplier Performance Rating as per Supplier Performance Monitoring and Rating System of BHEL for necessary action. Details are available at BHEL Website www.bhel.com for reference.
27.	**DEALING WITH BANNED SUPPLIERS / CONTRACTORS IN BHEL :** Offers of the bidders, who are on the banned list, as also the offers of the bidders who engage the services of the banned firms, shall be rejected. The list of banned firms is available on BHEL website www.bhel.com for reference.
28.	**ORDER OF PRECEDENCE :** The order of precedence shall be as follows :- a) Special Terms & Conditions (STC) for Tender Enquiry / Contract, if any b) General Terms & Conditions (GTC) for Tender Enquiry / Contract & Additional General Terms & Conditions (GTC) for Tender Enquiry / Contract for Erection Testing & Commissioning (ETC) at Site, if applicable Provisions in (a) above shall prevail over (b). In case of conflict, between Technical Specifications and STC / GTC, bidder to seek necessary clarifications from BHEL concerned official as specified in NIT.
29.	**PACKING :** Packing shall be in conformity with specifications and shall be such as to ensure prevention of damages, corrosion, deterioration, shortages, pilferage and loss in transit or storage. In case of shipment by sea or air, the packing shall be sea-worthy or air-worthy respectively and of international standards. Different types of spares i.e. start-up / commissioning spares and initial spares (mandatory spares and recommended O&M spares) are to be packed separately. Packing List shall be submitted as per standard format along with advance set of documents for claiming payment which shall also indicate :- a) Case / Packing size (as applicable). b) Gross weight and net weight of each package. c) Detailed contents of the package with quantity of each item separately. Project, Item / Package Description, BHELôs PO No. with date & Case / Packing Mark should also be clearly mentioned on the Case / Packing and Packing List for identification. Also, Packing List must be duly signed & should include respective Invoice No. & LR No. Note : Foreign suppliers to furnish details to arrange inland transportation by BHEL, if applicable, as follows :- i) No. of Packages ii) Size with Weight (Gross & Net) of each Package iii) No. of Containers with type & size required for inland transportation

Sr. No.	
	iv) Type of Cargo (Break Bulk / LCL / FCL) v) Customs Tariff No.
30.	**COLOUR CODING :** Aluminium stickers are required to be attached to large components but plastic sheet tags should be tied with small components, giving details like purchase order, description of the component, quantity etc. Tags should be of the colour as follows :- a) Main equipment : Yellow or White tag b) Start-up / Commissioning spares : Blue tag c) Mandatory spares : Pink or Red tag d) Recommended / O&M spares : Green tag
31.	**MICRO, SMALL & MEDIUM ENTERPRISES (MSME) :** MSMED Act 2006 as amended from time to time & extant regulations of Govt. of India for MSME will be applicable. Micro & Small Enterprises (MSE) can avail the intended benefits only if they submit along with the offer / bid, attested copies of either Acknowledgement of Entrepreneur Memorandum Part-II (EM-II certificate) having deemed validity (five years from the date of issue of acknowledgement in EM-II) or valid NSIC certificate or EM-II certificate along with attested copy of a CA certificate (As per BHEL format where deemed validity of EM-II certificate of five years have expired) applicable for the relevant financial year (latest audited). Date to be reckoned for determining the deemed validity will be the date of opening (for Techno-commercial Bid : Part-I in case of two part bid). Non-submission of such documents will lead to consideration of their bid at par with other bidders. No benefit shall be applicable for this enquiry if any deficiency in 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 arrested (in original) by a Gazetted officer. Copy of Udyog Aadhaar Memorandum with Acknowledgement of Ministry of Micro, Small & Medium Enterprises should also be furnished.
32.	**BUSINESS ETHICS / SUSPENSION OF BUSINESS DEALINGS WITH SUPPLIERS / CONTRACTORS :** If any bidder / supplier / contractor during pre-tendering / tendering / post tendering / award / execution / post-execution, indulges in malpractices cheating, bribery, fraud or other misconduct or formation of cartel so as to influence the bidding process or influences the price or fails to perform or is in default without any reasonable cause etc or performs any act considered objectionable as per extant guidelines, action may be taken against such bidders/supplier/contractor as per extant ñGuidelines for Suspension of Business Dealings with Suppliers/Contractorsò. Abridged version of same is available at BHEL website (www.bhel.com) on ñSupplier Registrationò Page.
33.	**REVERSE AUCTION :** BHEL reserve the right to go for Reverse Auction (RA) instead of opening the sealed envelope price bid, submitted by the bidder or price bid submitted by the bidder through e-procurement system. This will be decided after techno-commercial evaluation. All bidders to give their acceptance for participation in RA. Non-acceptance to participate in RA may result in non-consideration of their bids, in case BHEL decides to go for RA. In case BHEL decides to go for Reverse Auction, only those bidders who have given their unconditional acceptance to participate in RA will be allowed to participate in the Reverse Auction. Those bidders who have given their acceptance to participate in Reverse Auction will have to necessarily submit ñonline sealed bid in the Reverse Auction. Non-submission of ñonline sealed bid by the bidder will be considered as tampering of the tender process and will invite action by BHEL as per extant guidelines in vogue. General Terms and Conditions of RA are available at Annexure. Business Rules for

Sr. No.	
	RA shall be sent to the bidders before conducting RA. Abridged Version of ñCommon Guidelines for Conducting Reverse Auctionòmay also be seen at BHEL website (www.bhel.com) on ñSupplier Registrationò Page & ñTender NotificationsòPage.
34.	**INTEGRITY PACT :** Bidders shall have to enter into Integrity Pact with BHEL, duly signed with seal in original, if specified in NIT / RFQ failing which bidderôs offer shall be liable for rejection.
35.	**TERMINATION OF CONTRACT :** BHEL shall have the right to cancel the Purchase Order / Contract without any financial implication to BHEL if vendor approval by end user / customer is withdrawn or in case of Suspension of Business Dealings with the Suppliers / Contractors by BHEL. BHEL shall have the right to cancel Purchase Order / Contract, wholly or in part, in case they are obliged to do so on account of any decline, diminution, curtailment or stoppage of their business and in that event, the Supplierôs / Contractor' compensation claim shall be settled mutually. In case of cancellation of Purchase Order / Contract for main supply, all other associated Purchase Orders / Contracts like those for Mandatory Spares / Recommended Spares / Erection, Testing & Commissioning (ETC) / Supervision of ETC, if any, would also get cancelled.
36.	**SHELF LIFE :** Supplier has to inform the list of the items / sub-items which have limited shelf life like consumables or those required for the first fill and shall indicate the corresponding shelf life period in the offer. Such items / sub-items shall be manufactured / despatched only after getting formal clearance from BHEL.
37.	**LIMITATION OF LIABILITY :** Notwithstanding any other provisions, except in cases of wilful misconduct and / or criminal negligence / acts, a) Neither the Supplier / Contractor nor BHEL shall be liable to the other, whether in Purchase Order / Contract, tort, or otherwise, for any consequential loss or damage, loss of use, loss of production or loss of profits or interest costs, provided however that this exclusion shall not apply to any obligation of the Supplier / Contractor to pay Liquidated Damages to the BHEL and b) Notwithstanding any other provisions incorporated elsewhere in the contract, the aggregate liability of the Contractor in respect of this contract, whether under the Contract, in tort or otherwise, shall not exceed total Contract Price, provided however that this limitation shall not apply to any obligation of the Vendor to indemnify BHEL with respect to Patent Infringement or Intellectual Property Rights.
38.	**SHORTAGES / DAMAGES :** a) Against Supply only or Supply where Supervision of Erection, Testing & Commissioning (ETC) at Site or Supply where Testing & Commissioning at Site is in scope of the supplier : Any shortages and / or damages in supplies shall be supplied / replenished free of cost by the supplier as early as possible but not later than 30 days from the date of intimation by BHEL to the supplier. b) Against Supply where Erection, Testing & Commissioning (ETC) at Site is in scope of the supplier :

Sr. No.	
	Any shortages and / or damages in supplies and during handling / storage, erection, testing and commissioning at site shall be supplied / replenished free of cost by the Supplier / Contractor, as early as possible, to meet the contractual completion time / schedule. Note: There shall not be any extension in the contractual delivery time / schedule due to any shortages and / or damages in supplies.
39.	**VARIATION OF CONTRACT VALUE / QUANTITY VARIATION :** BHEL shall have the right to variation in quantities of items within ± 30% of the total Purchase Order / Contract value at the time of placement of PO or award of Contract on overall basis for all amendments together within two years from the date of original Purchase Order / Contract or completion of execution of the Purchase Order / Contract whichever is earlier but quantities of individual items may vary to any extent or may get deleted unless otherwise specified in the technical specifications. No compensation is payable due to variation in the quantities and the Supplier / Contractor shall be bound to accept the same the contracted prices / rates without any escalation. However, if the Purchase Order / Contract is on ñLumpsumò basis, no variation of Purchase Order / Contract value shall be admissible to the Supplier / Contractor within the scope of Purchase Order / Contract, as long as the inputs remain unchanged.
40.	**STATUTORY VARIATION :** GST rates prevailing at the time of dispatch of goods / completion of services shall be payable by BHEL. All other taxes, duties, charges, royalty, cess, other levies shall be deemed to be included in the Ex Works Prices / Charges quoted by bidders and no variations shall be payable in respect thereof. No other variations such as on customs duty, exchange rate, minimum wages, prices of controlled commodities, any other input etc. shall be payable by the BHEL. Notwithstanding anything above, where the actual completion of the supply / services occurs beyond the period stipulated in the Purchase Order / Contract or any extension thereof, variations referred to above, will be limited to the rates prevailing on the dates of such agreed completion periods only. For variations after the agreed completion periods, the Supplier / Contractor alone shall bear the impact for the upward revisions and for downward revisions BHEL shall be given the benefit of reduction in applicable taxes /GST. This will be without prejudice to the levy of liquidated damages for delay in delivery / completion. If new tax is introduced by Central/ State Govt / Municipality becomes directly applicable on items specified in Bill of Quantities/Purchase Order/Contract, full reimbursements shall be made provided it becomes applicable on items specified in Bill of Quantities. However, any additional tax implication due to delay in delivery, beyond the Contractual Delivery, attributable to supplier shall be borne by supplier.
41.	**MODE OF PAYMENT :** Payment shall be made directly to the Supplier / Contractor by BHEL through NEFT / RTGS.
42.	**CONFIDENTIALITY :** Supplier / Contractor shall, at all times, undertake to maintain complete confidentiality of all data, information, software, drawings & documents etc. belonging to BHEL and also of systems, procedures, reports, input documents, manuals, results and any other BHEL documents discussed and / or finalized during the course of execution of Purchase Order / Contract.
43.	**INDEMNIFICATION :** The Supplier / Contractor shall indemnify and keep indemnified and hold harmless BHEL and its employees and officers from and against any and all claims, suits, actions or administrative proceedings, demands, losses, damages, costs and

Sr. No.	
	expenses and any other claim of whatsoever nature in respect of the death or injury of any person or loss of or damage to any property arising during the course and out of the execution of the Purchase Order / Contract.
44.	**TITLE OF GOODS :** a) Ownership of the equipment / material procured in India, shall be transferred to BHEL upon loading on to the mode of transport to be used for transportation of the said equipment / material from the works to the site / destination and upon endorsement of the dispatch documents in favour of BHEL. b) Ownership of the equipment / material to be imported into the country where the site is located, if not procured in India, shall be transferred to BHEL upon loading on the mode of transport to be used for transportation of the equipment / material from the country of origin to that country / destination and upon endorsement of despatch document in favour of BHEL. c) Notwithstanding the transfer of ownership of the equipment / material, the responsibility for care and safe custody thereof together with the risk of loss or damage thereto for whatsoever reason shall remain with the Supplier.
45.	**COMPLIANCE OF STATUTORY REQUIREMENTS :** The vendor shall comply with all State and Central Laws / Acts, Statutory Rules, Regulations etc., as may be enacted by the Government during the tenure of the Purchase Order / Contract and having in force and applicable to the Purchase Order / Contract and nothing shall be done by the Supplier / Contractor in contravention of any Law / Act and / or Rules / Regulations, thereunder or any amendment thereof. The Supplier / Contractor shall pay all taxes, fees, licence charges / deposits, duties, tolls, royalty, commissions or other charges which may be levied on account of any of his operations connected with the Purchase Order / Contract. In case BHEL is constrained to make any of such payments, BHEL shall recover the same from the Supplier / Contractor either from moneys due to him or otherwise as deemed fit.
46.	**ACCEPTANCE OF ORDER :** Supplier should acknowledge and accept the Letter of Award / Purchase Order issued by BHEL within 7 days of the issue of Letter of Award / Purchase Order. In case of any discrepancy / typographical error in issue of Purchase Order / Contract, the agreed terms & conditions, scope of work, rates / prices for placement of PO / award of contract shall be applicable and BHEL reserves the right to issue amendment(s) to PO / Contract for correction of discrepancies / typographical errors in the PO / Contract at a later date.
47.	**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.

Signature of Bidder (Authorized Signatory) with Date & Seal

BHARAT HEAVY ELECTRICALS LTD.
(TRANSMISSION BUSINESS GROUP)

ADDITIONAL GENERAL TERMS AND CONDITIONS

FOR
TENDER ENQUIRY / CONTRACT
FOR
ERECTION, TESTING & COMMISSIONING (ETC) AT SITE

This is to be read in conjunction with General Terms and Conditions for Tender Enquiry / Contract "BHEL/TBG/GTC/2016" & submitted duly signed by bidder in original. Clause-wise deviations and / or additional conditions / clarifications, if any, are to be brought out clearly in "Schedule of Commercial Deviation". Deviations and / or additional conditions / clarifications, if any, mentioned elsewhere in the bid / offer, shall not be considered.

Sr. No.	
1.	**SCOPE OF WORK :** The scope of work of the successful bidder / contactor shall comprise but not limited to the following :- 1.1 Receipt of equipment / material at site, unloading, handling, transportation to storage area. 1.2 Inspection / verification of equipment / material received for any shortage / damage after opening the packing / cases and intimating the same to BHEL / Owner and underwriters within the time period specified by BHEL / Underwriters and to strictly follow the procedures specified. Storage of equipment in open / indoor store to be provided by BHEL in line with the instructions of BHEL. 1.3 Conservation / maintenance / up-keeping of the equipment / item in the store. 1.4 Temporary lighting in stores and construction area wherever required for their work. 1.5 Safety / Security of equipment / material. 1.6 Transportation of equipment / material from store to erection site, erection of equipment / material in line with the drawings / instructions to be furnished by BHEL, testing, commissioning including PG test (if applicable) and handing over. 1.7 Maintenance of associated equipment till handing over & any other activity necessary for completion of the job but not specifically mentioned in this specification. 1.8 Unloading, transportation to storage area, storing, up-keeping and handing over of spare items / equipment. 1.9 Safety, watch & ward of material at site which shall be sole responsibility of the Contractor. Note : In case unloading / watch & ward of material at site is not executed by the Contractor, BHEL reserve the right to get it executed with the available resources at the risk & cost of the Contractor.

Sr. No.	
2.	**PRICES :** Prices shall be firm for the total contract period and no price variation shall be applicable. Prices shall be inclusive of all taxes and duties, except GST. GST shall be payable extra only if quoted separately.
3.	**TESTING AND COMMISSIONING :** 2.1 All the electrical / mechanical test of the equipment & material and shall be arranged by the contractor as per standard specification / Field Quality Plan / Erection Manual / Directives of the Site Official / Owner. The contractor shall fill the check list for storage, erection, testing and commissioning of all their equipment as per BHEL systems to ensure proper quality of work. 2.2 All the testing equipment required to carry out the site test for all their equipment or the erected equipment shall be arranged by the contractor at his own cost. However, necessary instructions and guidelines will be given by BHEL / Owner. 2.3 The contractor shall be entirely responsible for the satisfactory erection and providing test equipment & skilled manpower for testing & commissioning of all equipment. 2.4 Before charging, the system shall have to be approved by Statutory Govt. Authorities like Electrical Inspector other concerned agency and the contractor has to arrange approval for the same.
4.	**CONSUMABLES :** The contractor shall maintain adequate inventory of necessary consumables at site prior to erection so that timely completion of the works under the contract is not held-up due to non-availability of consumables / spares.
5.	**COMMENCEMENT OF WORK :** Start / Zero date for the work shall be date of Contract / letter of intent or as specified in the Contract / activity schedule.
6.	**COMPLETION SCHEDULE :** The entire work under this tender enquiry is required to be completed as specified in NIT / Tender Enquiry.
7.	**OVER RUN CHARGES :** No over run charges are payable.
8.	**IDLE LABOUR CHARGES :** No idle labour charges will be admissible in the event of any stoppage of work resulting in the contractor's workmen being rendered idle due to any reason at any time.
9.	**SECURITY-CUM-PERFORMANCE BANK GUARANTEE :** The Contractor shall arrange to submit Security-cum-Performance BG for 10% of total Contract value for ETC at Site excluding taxes & duties along with first invoice or within 60 days from award of Contract whichever is earlier valid till guarantee period on a non-judicial stamp paper of appropriate value. • The Bank Guarantee shall be from any bank as per Annexure for List of Banks (32 Nos.). The original BG should be sent by issuing Bank directly to BHEL/TBG Sector Head, unless otherwise specified in the NIT. • Extension of validity of the BG in original, as per above clause, should be sent by issuing Bank directly to BHEL/TBG Sector Head, unless otherwise specified in the NIT, at least 45 days before expiry of validity of the BG. • Unless otherwise specified in the NIT, deviation taken for non-submission of BG, as applicable, shall not be accepted. • In case of non–submission BG / Deposit, as applicable, BHEL reserve the right for Risk Purchase as per terms of the NIT and impose Suspension of Business

Sr. No.	
	Dealings with the Supplier / Contractor. • BHEL reserves the right to encash the Bank Guarantee and forfeit the amount in the event of any default, failure or neglect on part of the Contractor in fulfilment of performance of the Contract. • Value of the Bank Guarantee (at the time of submission) shall remain unchanged for any subsequent variations in Contract value up to ± 20%. Beyond this variation of ± 20%, the Contractor shall arrange to enhance or may reduce the value of the Bank Guarantee accordingly.
10.	**INSURANCE :** The Contractor shall take insurance to cover his Tools and Plants, assets, workmen's compensation and third party liabilities. The contractor shall make available the original insurance certificates to the Site Official for necessary verification before commencement of work.
11.	**VARIATION OF CONTRACT VALUE / QUANTITY VARIATION :** BHEL shall have the right to variation in quantities of items within ± 20% of the total Contract value at the time of award of Contract on overall basis for all amendments together within four years from the date of original Contract or completion of execution of the Contract whichever is earlier but quantities of individual items may vary to any extent or may get deleted unless otherwise specified in the technical specifications. No compensation is payable due to variation in the quantities and the Contractor shall be bound to accept the same the contracted prices / rates without any escalation. However, if the Contract is on "Lumpsum" basis, no variation of Contract value shall be admissible to the Contractor within the scope of Contract, as long as the inputs remain unchanged.
12.	**GUARANTEE :** The equipment / material supplied and services rendered (if applicable) shall be guaranteed to be free from all defects and faults in design & engineering, material, workmanship & manufacture and in full conformity with the Contract, Technical Specifications & approved drawings / data sheets, if any, for 18 months from the date of last delivery or 12 months from the date of commissioning, whichever is later. The defective equipment / material / component shall be replaced free of cost at site. Any expenditure for dismantling and re-erection of the replaced equipment / material / component shall be to supplier's / contractor's account. All replacements during the guarantee period shall be delivered at site promptly and satisfactorily within a period not more than 45 days from the date of reporting the defect / rejection etc. In the event of the contractor failing to replace the defective equipment / material / component within the time period mentioned above, BHEL may proceed to undertake the replacement of such defective equipment / material / component at the risk and cost of the contractor without prejudice to any other rights under the contract and recover the same from BG / other dues of this Contract or any other Purchase Order / Contract executed by the contractor. Note : • In case of Illumination System, items viz. Lamps, Tubes, Ballast, Starters, and Capacitors & Fuses will not be under Guarantee after commissioning. • In addition to the above guarantee period, Extended Guarantee / Warranty, if any, shall be as per NIT / Technical Specifications. • In case offer of agent of Foreign OEM / Foreign Principal is considered, Guarantee as mentioned above has to be provided by the Foreign OEM / Foreign Principal also.

Sr. No.	
13.	**TERMS OF PAYMENT :** For Erection, Testing & Commissioning (ETC) at Site a) 70% of the Contract value against monthly progressive bills on pro-rata basis for unloading, storage and completion of erection as certified by BHEL Site Official with 60 days from the date of receipt of GST Compliant Tax Invoice (Original +2 Copies) b) 20% of the Contract value against monthly progressive bills on pro-rata basis for testing & successful commissioning as certified by BHEL Site Official within 60 days from the date of receipt of GST Compliant Tax invoice in 3 sets (original + 2 copies) c) 10% of the Contract value after Acceptance Test, Re-test (if any), PG Test (if any) and Handing Over as certified by BHEL Site Official within 60 days from the date of receipt of GST Compliant Tax invoice in 3 sets (original + 2 copies) Note: a. It should be ensured that Tax Invoice complies with statutory Requirements under GST law to enable BHEL to avail Input Tax Credit. b. Payment of GST component shall be made only if vendor has deposited the Tax and credit for the same is reflected in GSTN (GST Network) c. Copy of GST Registration Certificate(s) shall be also be attached with Tax Invoice
14.	**PRICE VARIATION / ESCALATION :** Prices shall be firm for total contract period and extended period, if any, and no price escalation / price variation will be applicable.
15.	**LIQUIDATED DAMAGES FOR DELAY IN ERECTION, TESTING & COMMISSIONING (ETC) AT SITE:** In case of delay in execution of Contract beyond the contractual completion time for Erection, Testing & Commissioning at Site, an amount of 0.5% of the total Contract value for ETC at Site per week of delay or part thereof subject to a maximum of 10% of the total Contract value for ETC at Site shall be deducted as Liquidated Damages (LD) along with applicable GST (if any) on LD. ~~However, in case of staggered (lot-wise) contractual completion schedule, an amount of 0.5% of the total Contract value for ETC at Site of delayed lot per week of delay or part thereof shall be deducted as liquidated damages , subject to maximum of 10% of the total Contract value for ETC at Site along with applicable GST(if any) on LD.~~ Note : i) In case of any amendment / revision, the LD shall be linked to the amended / revised Contract value and completion time / schedule for ETC at Site, if applicable. ii) If, as per contractor, delay is not attributable to the contractor, delay analysis with documentary evidence may be submitted by the contractor at the earliest but not later than six months from the end of the financial year in which the payment is withheld. Based on the above details / documents submitted by the contractor, BHEL shall take final decision and if considered appropriate by BHEL, withheld amount (full or part as the case may be) shall be released, otherwise, full or balance withheld amount shall be treated as deduction of Liquidated Damages (LD) towards delay in Erection, Testing & Commissioning at Site..
16.	**FACILITIES TO BE PROVIDED AT SITE BY THE CONTRACTOR :** ~~Watch and ward for the store and~~ safe custody of the equipment / material in the scope of Contractor shall be his responsibility. It is the responsibility of the contractor to dismantle and take away all the material of

Sr. No.	
	his office accommodation as soon as the work is handed over to BHEL / Owner and clean the area of debris.
17.	**ADDITIONAL EXPENDITURE :** In case any additional expenditure is incurred in the works arising out of the faulty execution of the works by the contractor, such additional expenditure shall be borne by the contractor.
18.	**REGULATION OF LOCAL AUTHORITIES & COMPLIANCE OF STATUTORY REQUIREMENTS :** The contractor shall give to the local Governing Body, Police and other concerned Authorities all such notice as may be required under law. The contractor, as required, will obtain independent licence under The Contract Labour (Regulation and Abolition) Act, 1970 from the concerned authorities based on the certificate (Form-V) issued by the Principal Employer / Customer. In case Contractor is not registered with GST authorities of state where project is located , vendor shall have to obtain registration with GST Authorities of state .The vendor shall comply with all State and Central Laws / Acts, Statutory Rules, Regulations etc., as may be enacted by the Government during the tenure of the Contract and having in force and applicable to the Contract and nothing shall be done by the Contractor in contravention of any Law / Act and / or Rules / Regulations, thereunder or any amendment thereof. Provisions of The Building & Other Construction Workers (Regulation of Employment and Conditions of Service) Act, 1996 and The Building & Other Construction Workers Welfare Cess Act, 1996 shall also be applicable. The Contractor shall pay all taxes, fees, licence charges / deposits, duties, tolls, royalty, commissions or other charges which may be levied on account of any of his operations connected with the Contract. In case BHEL is constrained to make any of such payments, BHEL shall recover the same from the Contractor either from moneys due to him or otherwise as deemed fit.
19.	**DISCIPLINE OF WORKMEN :** The contractor shall adhere to the disciplinary procedure set by the BHEL / owner in respect of his employees and workmen at site.
20.	**ELECTRICITY & WATER :** Electricity for ETC work shall be provided at one point on chargeable basis. The Contractor shall submit to the BHEL within thirty (30) days from the date of Purchase Order/Work Order whichever is later, his electrical power requirements, if any, to allow the planning of the same by BHEL. The contractor shall have to make his own arrangements for distribution to various locations for their works including proper switches / fuse units, distribution boards, cables, poles etc. to ensure safety of employees, workmen and equipment. If required the contractor shall employ DG Set operated equipment in addition to electrically operated ones to ensure timely completion of work. Contractor shall make all arrangements himself for the supply of construction water as well as potable water for labour and other personnel as the worksite/colony.
21.	**ARBITRATION :** In the event of any dispute emanating from and relating to this contract, the matter shall be referred to the sole arbitration of the person appointed by the competent authority of BHEL. Subject to aforesaid, the provisions of "The Arbitration and Conciliation Act, 1996" and the rules made thereunder as amended from time to time in India shall apply to the arbitration proceedings. The venue of arbitration shall be in New Delhi. Further there shall be no claim for any pre-reference or pendente-lite interest on the claims and any claim for such interest made shall be void. However, in case of contract with Public Sector Enterprise / Undertaking (PSE/PSU) or Govt. Dept., the extant guidelines of Govt. of India shall be followed.

Signature of Bidder (Authorized Signatory) with Date & Seal

BHARAT HEAVY ELECTRICALS LIMITED
TRANSMISSION BUSINESS ENGINEERING MANAGEMENT
NOIDA

DOCUMENT NO.	TB-382-316-005	REV 00	Prepared	Checked	Approved
TYPE OF DOC.	TECHNICAL SPECFICATION	NAME	DKS	VK	VK
Title: 400kV XLPE Cable & its Accessories		SIGN			
		DATE	11.10.2022	11.10.2022	11.10.2022
		GROUP	TBEM		
		WO No.	84008A		

CUSTOMER	THDC India Limited, Rishikesh, Uttarakhand
PROJECT	Vishnugad Pipalkoti Hydro Electric Project (4X111MW)

Contents

Section No.	Description	No of Pages
Section-1	Scope, Technical Requirements and Quantities	36
Section-2	Equipment Specification under scope of supplies/ service - Design basis report - Customer technical specification	70
Section-3	Project details and general technical requirements (For all equipment under the Project)	23
Section-4	Annexures	16
	Annexure-A: Compliance certificate to technical specification	
	Annexure-B: Deviation/ change request to technical specification	
	Annexure-C: Guaranteed technical particulars	
	Annexure-D: Technical checklist	

Remarks: Bidder to note that data and details of guaranteed technical particulars shall not be reviewed during technical evaluation/ scrutiny, hence compliance of guaranteed technical particulars in line with technical specification shall be bidder's responsibility.

Rev. No.	Date	Altered	Checked	Approved	
Distribution				To	
				Copies	

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CHECKLIST FOR TECHNICAL EVALUATION

Along with the technical offer/ bids, the bidder should submit this checklist confirming the inclusion of the enclosures as listed below,

Sl. No.	Documents to be enclosed	Bidder to confirm (Please tick "Confirmed")
1.	Supporting documents for compliance of Technical Qualifying Requirement.	Confirmed
2.	Unpriced BOQ duly mentioning "Quoted" for all the items, signed and sealed.	Confirmed
3.	Annexure- A duly signed and sealed & Annexure- B duly filled, signed and sealed.	Confirmed

Note: Any bidder not meeting the above requirement shall be liable for non-evaluation.

The above checklist is reviewed and verified for,

NIT Reference No.:

Name of Bidder:

Name of Project: Vishnugad Pipalkoti Hydro Electric Project (4X111MW)

Date: Bidder's Stamp & Signature

Contents

SECTION 1: 2

SCOPE, PROJECT SPECIFIC TECHNICAL REQUIREMENTS & BILL OF QUANTITIES 2

1. Scope 2
2. Codes & Standards 3
3. Specific Technical Requirements 5
4. Other General Requirements 8
5. Bill of Quantities 11
6. Drawings / Documents required for Engineering Manufacturing Clearance 12
7. Type Testing 12
8. Quality Plan 13
9. Inspection & Testing 14
10. Field Testing & Commissioning 15
11. Packing and Dispatch 15
12. Exceptions 16
13. Definitions Used 16
14. Abbreviations Used 17
15. List of Documents/ Drawings 18

SECTION 1:
SCOPE, PROJECT SPECIFIC TECHNICAL REQUIREMENTS & BILL OF QUANTITIES

1. Scope

This technical specification covers the requirements of design, engineering, manufacturing, inspection including third party inspection and testing at manufacturer's works before supply, proper packing and delivery to project site, unloading & storage at site, and installation/ laying, termination, jointing, dressing, testing at site & commissioning complete with all materials, support structures at designated locations including hardware and anchoring bolts, accessories, commissioning spares & maintenance spares, consumables, special spanners, tools & tackles, any specific required ancillary services & mandatory spares etc. including training of BHEL/ Customer personnel, if required at site for the equipment (**400kV XLPE Cable & its Accessories**) complete in all respect for efficient & trouble-free working mentioned under this specification.

Hence, scope of work under this requisition shall include but not be limited to basic and detailed engineering, as required, manufacturing, supply, transportation to site, inspection at manufacturer's work, installation/ laying, commissioning including site testing along with necessary equipment, training to Customer/ BHEL personnel, if required, supply of all mandatory spares, commissioning spares, special tools and tackles as required in drawings, standard specifications, standards etc. attached or referred with technical specification.

This section covers the specific technical requirements of the equipment (**400kV XLPE Cable & its Accessories**). This constitutes minimum technical parameters for the above item as specified by the BHEL/ Customer. The offered equipment (**400kV XLPE Cable & its Accessories**) shall also comply with the Section-3 (Project Details and General technical requirements for all equipment under the Project) and Section-2 (Equipment Specification Under Scope of Supplies) of this specification.

The specification comprises of following sections:

Section-1	:	Scope, Project Specific Technical Requirements & Bill of Quantities
Section-2	:	Equipment Specification under scope of Supplies/ Service
Section-3	:	Project Details & General Technical Requirements (For All Equipment under the Project)
Section-4	:	Annexures Annexure A- Compliance Certificate Annexure B- Schedule of Technical Deviations Annexure C- Guaranteed Technical Particulars Annexure D- Technical Checklist

The following order of priority shall be followed. In case of conflict between requirements specified in various documents, the more stringent one shall be followed. BHEL/ Customer concurrence shall, however, be obtained before taking a final decision in such matters.

1. Statutory Regulations

   In particular, the latest version of the following statutory regulations, as applicable, shall be followed for system,

   - Indian Electricity Act

- o CEA regulations
- o The Factory Act
- o Requirements of other statutory bodies as applicable, e.g. CEA etc.

2. Section-1
3. Section-2
4. Section-3
5. Codes & Standards

Bidder shall furnish list of conflicts/ ambiguities/ deviations, if any, along with their technical offer and also furnish the basis that is considered for submitting technical offer. BHEL/ Customer will resolve listed conflicts prior to award. In case of ambiguity, bidder shall inform BHEL/ Customer of their interpretation. In case bidder fails to convey the same prior to award, BHEL/ Customer decision on interpretation shall be considered final if need arises during the execution. No additional cost or extra time on account of conflicts/ ambiguities/ deviations shall be admissible.

In general, no deviation from the requirements specified in various clauses of this specification shall be allowed and hence, a certificate to this effect shall have to be furnished along with the offer (Annexure-A), however bidder shall furnish list of conflicts/ ambiguities/ deviations (Annexure-B), if any. Any conflicts/ ambiguities/ deviations mentioned elsewhere in technical offer shall not be reviewed.

The equipment (**400kV XLPE Cable & its Accessories**) is required for the following project:

Name of the Customer	:	**THDC India Limited, Rishikesh, Uttarakhand**
Name of Main Contractor	:	**Bharat Heavy Electricals Limited**
Name of the Project	:	**Vishnugad Pipalkoti Hydro Electric project (4X111MW)**

The scope of supplies shall be as per commercial terms and conditions enclosed separately with the notice inviting tender/ enquiry.

2. Codes & Standards

The equipment (**400kV XLPE Cable & its Accessories**) shall comply with the latest edition of the following standards as applicable,

IEC 60060	High Voltage Test Techniques Part-1
IEC 60066	Environment test
IEC 60187	General definitions and test requirements
IEC 60068	Seismic test methods for equipment
IEC 60137	Bushings for alternating voltage above 1000V (Outdoor bushing)
IEC 60183	Guide to the selection of high voltage cables
IEC 60228	Conductors of insulated cables
IEC 60229	Tests on cable over sheaths which have a special protective function and are applied by extrusion
IEC 60230	Impulse tests on cables and their accessories
IEC 60270	Partial discharge measurements
IEC 60287	Calculations of the continuous current rating of cables
IEC 60331	Fire resisting characteristic of electric cables

IEC 60332	Tests on electric cables under fire Part-I conditions – Test on a single vertical insulated wire or cable
IEC 60376	Specifications & acceptance of new Sulphur Hexaflouride (SF6) Gas
IEC 60506	Switching impulse test on EHV insulators
IEC 60540	Test methods for insulations and sheaths of electric cables and cords
IEC 60754	Tests on gases evolved during combustion of electric cables
IEC 60811	Common test methods for insulating and Part–I sheathing materials of electric cables (Sec-1) – Methods for general application –Measurement of thickness and overall dimensions – Tests for determining the mechanical properties
IEC 60811	Common test methods for insulating Part-1 and sheathing materials of electric (Sec-2) cables – Methods for general application – Thermal ageing methods.
IEC 60811	Insulating and sheathing materials Part-1 of electric cables- Common test (Sec-3) methods – General application –Methods for determining the density – Water absorption Test-Shrinkage test
IEC 60811	Common test methods for insulating Part-1 and sheathing materials of electric (Sec-4) cables – Methods for general application – Tests at low temperature
IEC 60811	Insulating and sheathing materials Part-2 of electric and optical cables –(Sec-1) Common test methods –Methods specific to elastomeric compounds– Ozone resistance, hot set and mineral oil immersion tests.
IEC 60811	Common test methods for insulating Part-3 and sheathing materials of electric (Sec-1) cables – Methods specific to PVC compounds – Pressure test at high temperature - Tests for resistance to cracking
IEC 60811	Common test methods for insulating Part-3 and sheathing materials of electric (Sec-2) cables – Methods specific to PVC compounds – Loss of mass test Thermal stability test
IEC 60811	Common test methods for insulating Part-4 and sheathing materials of electric (Sec-1) cables – Methods specific to Polyethylene (PE) and polypropylene (PP) compounds – Resistance to environmental stress cracking – wrapping test after thermal ageing in air – Measurement of the melt flow index – Carbon black and / or mineral content measurement in PE.
IEC 60859	Cable connections for gas insulated metal enclosed switchgear
IEC 60885	Electrical test methods for Part – 3 electric cables – Test methods for partial discharge measurements on lengths of extruded power cables
IEC 5831	PVC Compound
IEC 62067	Power cables with extruded insulation and their accessories for rated voltages above 150 kV (Um=170kV) upto 500 kV (Um=550kV)–Test methods and requirements
IS 72	Galvanizing of steel structure
IS 1893	Criteria for earthquake resistant design of structures.
IS 2062	Structural steel (standard quality)
IS 2633	Methods for testing uniformity of coating in Zn-coated articles
IS 5561	Electric power connectors
IS 10418	Drums for electric cables
ANSI/ IEEE	Guide for Electrical safety and Std 80-1986 sub-station grounding

3. Specific Technical Requirements

Specific technical requirements for the equipment (**400kV XLPE Cable & its Accessories**) shall be as follows,

Sl. No.	Description	Technical Parameters at EL 1000
1.	Type of cable	400kV, 1Cx800sqmm copper equivalent cross sectional area conductor, extruded cross-linked polyethylene (XLPE) insulated & corrugated aluminium/ laminated aluminium tape-sheathed and flame retardant PVC/PE/**HDPE** outer sheathed cable suitable for indoor/ outdoor installation (natural air ventilated cable tunnel, underground GIS hall and pothead yard).
2.	No. of Phases per circuit	3
3.	Rated voltage, kVrms	400
4.	Highest system voltage, kVrms	As per applicable IS/IEC
5.	Highest system voltage, kVrms	50±3%
6.	Rated Short circuit withstand current at a rated voltage for 1sec, kArms	Not less than 40 for, - for conductor - for metallic sheath
7.	Dynamic short circuit withstand, kApeak	100
8.	Rated Lightning impulse withstand voltage, kVpeak	1425
9.	Rated Switching impulse withstand voltage to earth, kVpeak	1050
10.	Rated One minute power frequency withstand voltage to earth, kVrms	630
11.	Limits of temperature rise for conductor, XLPE insulation and sheath	As per IEC
12.	Material of insulation	Extruded Cross-linked polyethylene (XLPE)

13.	Insulation screen/ bedding	Extruded semiconducting compound semiconductor tape
14.	Longitudinal water barrier(i.e. Bedding)	Copper wires (woven fabric tape) with swelling compound/ water barrier tape to form water protection barrier
15.	Material of Conductor	Copper
16.	Copper equivalent cross-sectional area of conductor, sqmm	800
17.	Shape of conductor	Stranded circular single/ segmented circular
18.	Conductor screen	Bedding Semi-conducting material/ extruded layer of semiconducting compound
19.	Maximum resistance of conductor at 20 deg C	0.0224 Ω/km
20.	Metallic sheath (i.e. Inner sheath (material)	Extruded corrugated aluminium/ laminated aluminium tape
21.	Outer protective sheath	Flame retardant Poly-vinyl Chloride (PVC)/ Polyethylene (PE)/ High Density Polyethylene (HDPE), subject to following, -Oxygen index shall be 24% (min.) -Flammability test shall be carried out as per IEC 332-1.
22.	Type of metallic sheath earthing at GIS end	Solidly earthed through Disconnecting link box/ Cable covering protection unit (CCPU) with surge voltage limiter (SVL)
23.	Type of metallic sheath earthing at pothead yard end	Solidly earthed through Disconnecting link box/ Cable covering protection unit (CCPU) without surge voltage limiter (SVL)
24.	Design ambient temperature Maximum ambient temperature Minimum ambient temperature	40˚C 40˚C -7˚C
25.	Partial discharge level for routine test	≤10pC at 1.5Un/√3=345kV
26.	Partial discharge level for type test	≤5p Cat1.5 Un /√3 = 345kV

27.	Corona extinction voltage	Not exceeding 320kVrms
28.	Radio interference voltage (at 266kV rms)	Not exceeding 500 micro volts
29.	Operating temperature of conductor	
	a) Maximum Temperature rise over ambient temperature of 40˚C	52˚C
	b) Maximum permissible temperature during normal operation	90˚C
	c) Maximum permissible temperature during overload	100˚C
	d) Maximum permissible temperature during short circuit	250˚C
30.	Maximum electric stress during normal operation	
	a) On the internal semi-conducting layer	16kV/mm
	b) On the outer semi-conducting layer	7kV/mm
31.	Maximum Continuous Current rating of single core cable	1000A
32.	Cable circuit details	3 core for line -1/2 and 1 core for spare
33.	Creepage distance for termination	25mm/kV
34.	Daily load	24hrs
35.	Sheath voltage	Sheath voltage to ground under normal operating condition shall not exceed 65V
36.	Laying method	Cable & ventilation tunnel/ trench/ cable gallery floor on cable racks support
37.	Cable configuration	Flat form
38.	Screen earthing method	Single point bonding
39.	System earthing	Effectively earthed (solidly grounded)

Notes:

1. Bidder shall submit detailed calculation of **altitude correction factor** during detailed engineering stage, as per relevant IEC. Altitude correction factor shall be applied on above technical parameters for cable and accessories, if applicable.
2. Bidder shall submit following design calculations,
   (i) Insulation dimensions including thickness of inner/ outer sheath and semi-conducting layers.
   (ii) Verification of thermal withstand capacity of XLPE cables for short circuit current.
   (iii) Conductor, conductor sheath, insulation and structure losses.
   (iv) Temperature rise
   (v) Cooling and anti-condensation behavior.
   (vi) Voltage gradient calculations for operating voltage, highest system voltage and for transient voltage.
   (vii) Supporting steel structure design and calculations.
   (viii) Mechanical forces and stresses induced in cable conductor and metallic sheath to prove the mechanical strength.
3. Further to above, bidder shall also submit the following design calculations,
   (i) Design calculations of 400kV XLPE cables (conductor & sheath) to withstand short circuit current for 1 sec.
   (ii) Design calculations for thermal withstanding capacity for short circuit current (conductor & sheath).
   (iii) Typical graph showing the voltage gradient along the radii of conductor and insulation for 1000A continuous current at different power factor between 0.9 (over-excited) to 0.9 (under excited).
   (iv) Calculation indicating that the 800sqmm copper (equivalent) conductor single phase 400 kV XLPE cable is capable to carry 1000A continuous current.
   (v) Calculations of cable for following,
   - Screen/ sheath voltage under full load condition,
   - Screen/ sheath voltage during an external three phase symmetrical through-fault
   (vi) Calculations for screen/ sheath voltage/ current and the recommended method for metallic screen bonding and screen sizing shall be designed in such a manner so that it can carry the earth fault current level of the system, considering system is solidly grounded.

4. Other General Requirements

The other general requirements for the equipment (**400kV XLPE Cable & its Accessories**) shall be in line with **Annexure 3- Scope Division Matrix** as per following details,

1. Schedule
   - Bidder shall submit detailed bar chart for engineering approval, site installation, testing and commissioning activities.
   - Bidder shall submit list of consumables with shelf life of fewer than two years, if applicable and same shall be dispatched just before the erection and only after specific clearance from BHEL/ THDCIL/ Consultant.
   - In addition to this, packing of XLPE cable accessories shall be suitable for long term storage without any deterioration in quality and performance (min. 2 years, if

required).

2. Open/ closed store
   - Open/ closed store area shall be provided by BHEL, however, bidder shall provide their requirement of space in open/ closed store during tender stage only.
   - In addition to this, bidder shall also provide their standard recommendations for precautions to be taken during unloading and storage etc. for approval of BHEL/ Consultant/ Customer.
   - Unloading of XLPE cables and its accessories at site, storage in open/ closed store as per requirement shall be in bidder's scope.
   - During storage of materials in BHEL provided open/ closed store, watch and ward shall be provided by BHEL, however, in case materials are taken out from store, it shall be bidder's responsibility to arrange the watch and ward round the clock.
3. Office facility at project site
   - Office facilities including sitting arrangement, stationary, printer etc. and accommodation for bidder's staff at project site along with local conveyance shall be in bidder's scope.
   - Arrangement of drinking water and personal protective equipment for staff and workers shall be in bidder's scope.
4. Site Staff including site supervisor, qualified jointers and workers
   - Site staff including site supervisor, skilled technician, qualified jointer and other workers along with tools & tackles, testing instruments, general tools and tackles, special tools and tackles, Tools and plant is deemed to be included in bidder's scope including loading, unloading and transportation.
   - Termination/ jointing of cables shall be done by skilled and experienced jointer certified by OEM and duly approved by BHEL/ Consultant/ Customer.
5. Construction supply
   - For construction requirements, the necessary power supply at site shall be provided by BHEL at one point only, however supply requirements for HV AC/ DC testing etc. shall be arranged by bidder only. Power supply provided shall be on chargeable basis.
6. Cable supporting rack assembly structure & termination/ sealing end supporting structure
   - The XLPE cables from the GIS hall to pothead yard shall be laid on **Cable supporting rack assembly structure**. Vertical and horizontal supports of rack assembly shall consist of galvanized steel. The cable rack assembly and supports shall be supplied complete in all respects with necessary embedment, hardware, cable spacers, aluminum blocks for snaking, earthing material etc. The cable rack assembly and supports shall have sufficient strength to cater to the static & dynamic loads. The zinc coating shall be uniform, clean, smooth and free from spangle as possible. The zinc coating shall weigh not less than 0.61 Kg/m2 over the area covered and not less than 0.09mm in thickness. All galvanizing shall comply with the requirements of the relevant IEC/IS or ASTM Standards.
   - Supporting structure for outdoor termination/ sealing end shall consist of galvanized steel members. The supporting structure shall be supplied complete in all respect with necessary embedment, hardware, earthing material etc. The zinc coating shall be uniform, clean, smooth and free from spangle as possible. The zinc coating shall weigh not less than 0.61 Kg/m2 over the area covered and not less than 0.09 mm in

thickness. All galvanizing shall comply with the requirements of the relevant IEC/IS or ASTM Standards.

- Supply and installation of cable supporting assembly structure and termination/ sealing supporting structure including block-outs, bracket supports, fixtures / inserts, anchor fasteners necessary for proper installation of XLPE cable shall be in bidder's scope.
- Installation and fixing of materials required for earthing for complete route of XLPE cable and its end termination shall be in bidder's scope. The earth grid connection shall not be available at all points in route and, hence provisions of independent earthing including rod electrode etc. shall be deemed to be included in bidder's scope.
- The associated activities including cutting, drilling, welding, painting and fabrication etc. including minor civil works required for completion of XLPE cable work shall be in bidder's scope.

7. Installation of XLPE cable
   - The XLPE cables shall be laid in cable ventilation tunnel /trench/ cable gallery floor / GIS floor on racks support assembly, as per site requirement.
   - The XLPE cable shall be installed in a snaked shape to absorb the thermal expansion and contraction of the cables or suitable arrangements shall be proposed by the bidder for the cable laying so as to compensate the thermal expansion and contraction for temperatures variations.
   - General & Special tools required for laying, hauling, installation and dismantling of the XLPE cables and its accessories shall be in bidder's scope.
   - Materials required for repair and maintenance of cables during laying/ after laying, if found/ observed during pre-commissioning stage shall be arranged by bidder to make it good to the satisfaction of BHEL/ Customer.
8. Termination and jointing of GIS and cable sealing end
   - Tools & tackles, testing instruments for termination/ jointing, tools for termination, scaffolding for support and making platform at elevated position, arrangement for controlled environment, crane/ hydra for lifting, heating arrangement etc. to complete termination and jointing work complete in all respect shall be bidder's scope.
   - Cable accessories damaged during installation, testing & commissioning shall be made good/ repaired/ replaced by bidder to the satisfaction of BHEL/ Customer.
9. Site Testing & Commissioning
   - Testing instruments/ kits including HV AC/ DC testing kit and partial discharge measurement equipment for field test, if required shall be provided by bidder along with valid calibration certificate.
   - Bidder shall depute its qualified testing & commissioning engineer at site for successful testing and commissioning of XLPE cable system.
   - Bidder shall submit complete methodology for conduction of site tests for further approval of BHEL/ Customer/ Consultant before testing & commissioning activities.
   - Different cable circuits may be commissioned at different point of time, and hence deployment the resources at multiple times at site in line with actual requirement is envisaged.
10. Training of BHEL/ Customer personnel
    - Training of BHEL/ customer personnel on 400kV XLPE cable and accessories shall be provided at vendor's works. However, to & fro travelling charges, lodging and boarding

charges for BHEL/ customer personnel shall not be borne by bidder.

11. Drum length and tolerance
    - XLPE Cables shall be supplied in tentative drum lengths of 570-660 meters for required 400kV XLPE cable unless otherwise specified. However, exact drum lengths shall be finalized during route survey. Due consideration shall be given to the route length & proposed screen bonding scheme to finalize drum lengths and transportation.
    - The non-returnable cable drums shall be supplied with definite cable length (to be informed before start of manufacturing) within +/-2 m tolerance and hence, bidder shall not be reimbursed for excess lengths supplied. Cable drums with shorter lengths shall not be accepted.
    - Each cable end shall be hermetically sealed by means of PVC/ Rubber/ non hygroscopic sealing compound caps so as to protect the cable from outside moisture & ingress of water during transit, storage and laying. At top cable end, pulling eye shall be provided.
12. Basic Arrangement
    - The two nos. 400kV outgoing GIS line feeder bays located at EL 1046 shall be connected to 400kV pothead yard located at EL 1100.39 by 1Cx800sqmm Copper conductor XLPE cable per phase running inside the cable tunnel.
    - b) Spare 1Cx800sqmm Copper conductor XLPE cable shall run between two nos. GIS line feeders and pothead yard. Spare cables shall be placed on GIS floor with end cap without termination at GIS end and on ground with end cap without termination at pothead yard end. Spare cable shall be kept beyond the farthest end at both side, so that it may be connected to any phase whenever required as per future requirements.

5. Bill of Quantities

1. Schedule of quantities for supply & services for the equipment (**400kV XLPE Cable & its Accessories**) shall be as per **ANNEXURE 1- BOQ for 400kV Cable & Accessories**. However, any supply/ service not appearing herein but required for completeness of the work is deemed to be included in bidder's scope.
2. Bidder may please be noted that the exact cable length shall be decided after joint route survey during site visit and making precise measurements at contract stage. Manufacturing cable cut length and drum length shall be determined with consultation & approval with BHEL/ Customer/ Consultant.
    a. The Payment of cables length for supply shall be as per approved quantities by BHEL/ Customer/ consultant.
    b. The Payment of cables length installation will be as per actual measurement at site which shall also include cable terminations.
    c. The exact length may vary by -20% to +20% at contract stage based on actual measurement at site and calculations submitted by the bidder. However, Individual quantity of other items may vary to any extent and may get deleted during contract/ execution stage.
    d. The bidder must fill up all the details required for offered item/s. Instead of indicating "refer drawing, or as per IS/IEC", the exact value/s must be filled in.

6. Drawings / Documents required for Engineering Manufacturing Clearance

Drawings/ documents detailed as per **Annexure 2- Details for Lot wise Technical Clearance for Manufacturing** shall be used for providing technical clearance for manufacturing of the equipment (**400kV XLPE Cable & its Accessories**), which shall be used for engineering delay analysis, if applicable for respective group.

The technical clearance for manufacturing shall be provided Lot wise, however, lot item can be clubbed together subject to condition of approval of drawing/ documents. Technical clearance for manufacturing shall be issued after approval of drawings in Category-I (approval without any comments)/ category-II (approval with comments) from customer/ BHEL, however it shall be sole discretion of engineering department to include/ exclude the drawing/ document earmarked for consideration for any particular Lot. In case drawing/ document are not duly stamped in category-1/ category-2 by customer, BHEL stamp/ confirmation shall be treated final to proceed further.

Date of Submission of drawings/ documents shall be counted only from the date of submission of reasonably correct drawings/ documents.

The successful bidder shall have to extend all possible support such as timely submission/ re-submission of drawings, visit to end customer to facilitate documents approval without any commercial implications to BHEL. Acceptance of bidder's documents shall be subject to end customer/ THDCIL approval.

7. Type Testing

Bidder shall ensure that the equipment (**400kV XLPE Cable & its Accessories**) being procured should have valid type test certificates as specified in IS/ IEC standards (e.g. IEC 62067) (amended up to date) at any independent laboratory/ NABL accredited laboratory of respective country. The validity of type test reports shall be per CEA guidelines, amended time to time.

The complete type test certificates and data sheets for cables and its accessories shall be furnished by bidder. If the tests conducted are not to the satisfaction of BHEL/ consultant/ customer, the tests shall be re-conducted by bidder without any commercial implication to BHEL.
Further, in case, any of type tests have not been conducted on the offered design or there has been a change in the design after the type tests, the requisite tests shall be conducted by bidder on the offered design by bidder without any commercial implication to BHEL.

The list of type test, applicable are as follows,

a) Check on insulation thickness as per IEC 60811 (check of cable construction).
b) Tan δ measurement.
c) Partial discharge test after complete assembly of end terminations
   i) at ambient temperature
   ii) at high temperature (90^0C)
d) Cable bending test followed by installation accessories and partial discharge test at ambient temperature.
e) Switching impulse voltage withstand test as per IEC 60230/ 62067.

f) Lightning Impulse voltage withstand test followed by power frequency voltage test as per IEC 62067/ 60230.
g) Ageing treatment as per IEC 60811.
h) Tests for determining the mechanical properties of insulation and outer sheath before and after ageing
i) Heat cycle voltage test as per IEC 62067.
j) Flame retardant test on outer sheath.
k) Oil resistant test on outer sheath.
l) Measurement of hardness of outer sheath.
m) Abrasion test on outer sheath.
n) Insulation shrinkage test.
o) Measurement of resistivity of semiconducting screens as per IEC 62067.
p) Conditioning & mechanical test as per IEC 60811.
q) Loss of mass test on PVC over sheath.
r) Pressure test at low & high temperatures on over sheaths.
s) Heat shock test on over sheath.
t) Hot set test for XLPE insulation.
u) Measurement of carbon black contents in PE over sheath.
v) Water penetration test.
w) Annealing test (for copper)

8. Quality Plan

The successful bidder shall submit Quality Assurance Plan for **400kV XLPE Cable & its Accessories** etc. including in-process inspection methods, tests, records, etc. for BHEL/ consultant/ customer approval. Customer hold points will also be included in the plan, which shall be mutually agreed by the BHEL/ consultant/ customer. In case bidder has reference Quality Assurance Plan agreed with BHEL/ consultant/ customer, same shall be submitted for specific project to BHEL/ consultant/ customer approval. There shall be no commercial implication to BHEL/ consultant/ customer on account of Quality Plan approval.

Superior quality control system shall be adopted to assure high product quality. Raw materials of the best commercial grade quality and high reliability shall be used in the manufacture of the equipment (**400kV XLPE Cable & its Accessories**). All materials shall be procured, manufactured, inspected and tested by vendor/ sub-vendor as per approved quality plan. The supplier shall perform all tests necessary to ensure that the material and workmanship conform to the relevant standards and comply with the requirements of the specification. Charges for all tests for the equipment (**400kV XLPE Cable & its Accessories**) shall be deemed to be included in bidder's scope.

9. Inspection & Testing

1. the equipment (**400kV XLPE Cable & its Accessories**) shall be subject to inspection by BHEL/ consultant/ customer or authorized representative at bidder/manufacturers' works. Hence, Bidder shall furnish all necessary information concerning the supply to BHEL/ Customer.
2. The inspector shall have free access to the manufacturer's/ supplier's works for the purpose of inspecting the process of manufacture in all its stages and he will have the power to reject any material, which appears to him to be of unsuitable description or of unsatisfactory quality.
3. Bidder shall give at least 2 weeks' advance notice to BHEL/ consultant/ customer, regarding the date of testing to enable him or his representative to witness the tests. All the tests must be done as per the approved QAP.
4. Bidder shall also furnish factory acceptance test (FAT) from manufacturers for BHEL/ consultant/ customer approval in line with specific requirements.
5. Routine and sample tests shall be carried out as per IEC 62067 on 400kV XLPE cable system.
6. Test for loss measurements as per IEC 62067/ 60287, as applicable shall be carried out on 400kV XLPE cable system.
   The guaranteed power losses in 400kV XLPE cable for estimate route length of 400m are mentioned below in line with contract specification,

a)	Guaranteed **power loss in conductor/ copper loss** in each length of 400m approx. or as required (without tolerance) conductor temperature of 90° C.	**21842.4W for 400m**
b)	Guaranteed **dielectric power loss** in each length of 400m approx. or as required (without tolerance) conductor temperature of 90°C.	**1199.28W for 400m**
c)	Guaranteed **power loss in metallic sheath** for each length of 400m approx. or as required (without tolerance) at conductor temperature 90°C	**3971.76W for 400m**
d)	Guaranteed **total power losses** in each length of 400m approx. or as required (without tolerance) conductor temperature of 90° C {(a)+(b)+(c)}	**27013.44W for 400m**
e)	Max. permissible iron losses in supporting structures	**Not applicable**

Note:

1. The total losses listed in the guaranteed and other technical particulars shall be the losses of each length of approximate 400m as mentioned above of XLPE cable. The computation of losses shall be based on specified conductor, sheath and structures at maximum operating voltage and temperature for each cable length. The computation procedures and results shall also be submitted to the purchaser for reference.
2. The bidder shall guarantee the above parameters of XLPE power cables and the same shall be verified at the manufacturer's works. However, in actual supplied 400kV XLPE cable, if it is found that actual losses are more than the values guaranteed above, penalty shall be levied/ recovered at the rate of INR 1,50,000 (INR One lakh fifty thousand)/ KW.

3. The purchaser reserves the right to reject the cable if the losses exceed the declared losses beyond tolerable limits as specified or the temperature rise of cable exceeds the guaranteed values quoted by the bidder.
4. *To verify the actual losses, the actual DC resistance shall be measured to calculate the AC resistance of the cable, using factors as given in **IEC 60287**. Further, the actual loss angle (dielectric loss) and other parameters shall also be measured during testing. The actual losses may then be determined based on these measured/ calculated values.*

10. Field Testing & Commissioning

1. Bidder shall carry out the installation, field testing and commissioning of the equipment (**400kV XLPE Cable & its Accessories**).
2. Field testing and commissioning of the equipment (**400kV XLPE Cable & its Accessories**) shall be done by Bidder/OEM only.
3. Bidder shall also submit site acceptance testing (SAT) procedures and get them approved from BHEL/ consultant/ customer before carrying out the site testing. Following site test as per IEC 62067, if applicable shall be conducted after laying of cable and installation of accessories.
   - DC voltage test of the over sheath (Cl 16.2 of IEC 62067)
   - AC voltage test of the insulation (Cl 16.3 of IEC 62067)
   - Partial discharge measurement test, if applicable
4. Bidder/ OEM shall coordinate with manufacturers of other equipment wherever required and shall freely and readily supply all technical information for this purpose as and when called for.
5. Further appropriate testing and commissioning reports and as-built documentation as necessary, shall be submitted.

11. Packing and Dispatch

1. Cables shall be despatched in non-returnable steel drums of suitable barrel diameter, securely battened, with the take-off end fully protected against mechanical damage. Ferrous parts used shall be treated with a suitable rust preventive finish or coating to avoid rusting during transit or storage.
2. The following information shall be marked on the drum,
   a. Reference to IS: 10418
   b. Manufacturer's name, trade mark/ brand name
   c. Type of cable and voltage grade
   d. Number of cores
   e. Nominal Conductor cross-section area and material
   f. Type of insulation
   g. Cable code
   h. Cable drum number
   i. Length of cable in each drum
   j. Direction of rotation of the drum (by means of an arrow)
   k. Gross weight
   l. Year and country of manufacture
   m. Location of the cable outer end by an arrow
   n. Section of cable route for which the cable is intended.

o. The details indicated in (h), (i), (j), (m) and (n) shall be painted on both sides of the drum.

3. A weather proof tag suitable for 2 years of outdoor, storage shall be affixed to each real, visible without removal of packing material with the information above.
4. The finished cable shall be identified by embossing the following identification on cable external surface at less than 1 meter intervals longitudinally:
   a. Manufacturer's name or trademark
   b. Year of manufacturer
   c. Cable size
   d. Cable rating
   e. Cable code as per IS 7098 (Part-2) for XLPE insulated cables.
   f. Sequential length mark shall be provided at each metre along with the above markings.
5. Cables shall be supplied in steel drums lengths as per approved cable cut lengths unless otherwise specified. However exact drum lengths shall be finalised during order execution. Due consideration shall be given to the route length & proposed screen bonding scheme to finalise drum lengths. A tolerance of +3% shall be permissible for each drum. However overall tolerance on each size of cable shall be limited to +2%.
6. Each cable end shall be hermetically sealed by means of PVC/ Rubber/ non hygroscopic sealing compound cups so as to protect the cable from outside moisture & ingress of water during transit, storage and laying. At top cable end, pulling eye shall be provided.
7. Cable accessories shall be carefully packed for transport by sea, rail and road in such a manner that it is protected against the climatic conditions and for any damage during transportation, transit and storage. Packing of cable accessories shall be suitable for long storage (minimum 2 year).

12. Exceptions

1. Cable support structure for Cable sealing end shall not be in bidder's scope. It shall be supplied and erected by BHEL/ its contractor.
2. All activities including gas work and other assistance work related to GIS termination work in 400kV GIS cable connection shall not be in bidder's scope as per applicable IS/IEC.
3. During storage of materials in BHEL provided open/ closed store, watch and ward shall be provided by BHEL, however, in case materials are taken out from store, it shall be bidder's responsibility to arrange the watch and ward round the clock.
4. For construction requirements, the necessary power supply at site shall be provided by BHEL at one point only, however supply requirements for HV AC/ DC testing etc. shall be arranged by bidder only. Power supply provided shall be on chargeable basis.

13. Definitions Used

The following expressions hereunder and elsewhere in the technical specification used and their grammatical variations shall unless repugnant to the subject or context thereof, have the following meanings hereunder respectively assigned to them, namely:

1. Bid/ Bidding Documents: The totality of the documents comprising the Bidding Document for the notice inviting tender.

2. Contract: The totality of agreement between Customer/ Purchaser/ Owner and the Contractor/ BHEL as derived from the contract documents.
3. Contractor: The bidder selected by the Customer/ Purchaser/ Owner for the performance of the work and supply of materials. In this case, it is BHEL.
4. Customer/ Purchaser/ Owner: THDC India Limited
5. Consultant: Any person(s)/ Firm nominated/ assigned by the Customer/ Purchaser/ Owner for providing the engineering consultant services.
6. Bidder/ vendor: The bidder selected for this intended work shall be known as vendor.

14. Abbreviations Used

The following terminology/ acronym hereunder and elsewhere in the technical specification used and their grammatical variations shall unless repugnant to the subject or context thereof, have the following full form hereunder respectively assigned to them, namely,

AC:	Alternating Current
DC:	Direct Current
kV:	Kilovolt
Hz:	Hertz
IP:	Ingress Protection
GIS:	Gas Insulated Switchgear
CSE:	Cable Sealing End
PVC:	Polyvinyl Chloride
HR PVC:	Heat Resistant Polyvinyl Chloride
UV:	Ultra Violet
PE:	Poly Ethylene
XLPE:	Cross-linked Polyethylene
HV:	High Voltage
EHV:	Extra High Voltage
EPR:	Ethylene Propylene Rubber
FR:	Flame Retardant
SAT:	Site Acceptance Testing
BOQ:	Bill of Quantities
QAP:	Quality Assurance Plan
NIT:	Notice Inviting Tender
OEM:	Original Equipment Manufacturer
BHEL:	Bharat Heavy Electricals Limited
BIS:	Bureau of Indian Standards
BS:	British Standard
ANSI:	American National Standards Institute
ASTM:	American Society for Testing and Materials
IS:	Indian Standards
IEC:	International Electro Technical Commission
IEEE:	Institute of Electrical & Electronics Engineers
CEA:	Central Electricity Authority

NEMA: National Electrical Manufacturers Association

15. List of Documents/ Drawings

Following drawing/ documents are attached for information purpose,

1. Annexure 1- BOQ for 420kV GIS & its Accessories
2. Annexure 2- Details for Lot wise Technical Clearance for Manufacturing
3. Annexure 3- Scope Division Matrix
4. TB-3-382-510-001: Single Line Diagram for 400kV GIS and Pothead yard
5. TB-3-382-316-002: Layout Plan & Section Drawing for Pothead Yard
6. TB-3-382-316-014: Conceptual Layout of GIS
7. TB-0-382-316-006: Trench Layout for Outdoor Pothead yard

1098921/2022/TBG-TB_ENGG_PA

ANNEXURE 1- BOQ for 400kV XLPE Cable & its Accessories

Rev No. 00

Sl. No.	Item Description	Long Description	Unit	Qty.
A.	**Supply Item: Cable**			
1	400kV, 1Cx800sqmm Copper conductor XLPE cable	Copper conductor XLPE cable shall be complete in all respect and comprising of following but not limited to, 1. The cable construction shall as per technical specification/ Section-2. 2. The exact cable length shall be decided and finalized after visiting site & making precise measurements at contract stage. Manufacturing lengths and drum length shall be determined with consultation & approval of BHEL/ Customer/ Consultant. however, requirement includes main and spare cables. 3. Bidder shall furnish cable calculations for following during tendering stage only, (a) Screen/ sheath voltage under full load condition, (b) Screen/ sheath voltage during an external three phase symmetrical through-fault. 4. Bidder shall furnish calculations for screen/ sheath voltage/ current and the recommended method for metallic screen bonding and screen sizing shall be designed in such a manner so that it can carry the earth fault current level of the system, considering 400kV system is earthed. 5. Any other item/(s) including cable end caps, pulling eye etc. required to complete the supply in all respect but not limited to above shall be in bidder's scope.	Running meter	4200
2	Bonding cable along with accessories	Bonding cable shall be complete in all respect and comprising of following but not limited to, 1. Bonding cable shall be used for earthing the metallic sheath of XLPE insulated power cables to disconnecting link box and then to earth grid. 2. Size of bonding cable shall be decided based on short circuit requirements and suitable single clamps along with hardwares for fixing of bonding cable shall be part of scope. 3. Any other item/(s) including lugs/ connectors and other accessories required to complete the supply shall be in bidder's scope.	Running meter	100
3	Earthing continuity cable along with accessories	Earthing continuity cable shall be complete in all respect and comprising of following but not limited to, 1. Earthing continuity cable shall be used for earthing continuity wire equalizing earth level between disconnecting links of both ends. 2. Size of earthing continuity cable shall be decided based on short circuit requirements and suitable single clamps along with hardwares for fixing of bonding cable shall be part of scope. 3. Any other item/(s) including lugs/ connectors and other accessories required to complete the supply shall be in bidder's scope.	Running Meter	1400
	Supply Item: Cable Accessories			
4	400kV, Indoor GIS Sealing/ Termination End Kit, compatible for 400kV, 1Cx800sqmm, Copper conductor, XLPE cable	Sealing/ termination kit shall be complete in all respect and comprising of following but not limited to, 1. SF6 indoor sealing/ termination ends shall be located inside of the underground GIS Hall to be directly connected with 400kV Gas Insulated Switchgear(GIS). 2. The housing of the SF6 indoor sealing/ termination end shall be of porcelain / epoxy resin insulator type suitable for use with SF6 gas and shall have sufficient strength against mechanical, electrical and thermal stresses. 3. The cable end terminating kit shall be SF6 indoor type and suitable for the size of conductor, insulation and voltage/ current ratings of the cable and it shall confirm to IEC 62271-209. 4. Any other item/(s) such as weather shields/ sealing ends, Copper lugs/ connector suitable for size of conductor, Non-magnetic glands/ dummy glands, hardware and other accessories required to complete the supply in all respects but not limited to above shall be in bidder's scope. (1 Set= 1-phase termination requirements)	Set	6
5	400kV, Outdoor Cable Sealing/ Termination End Kit, compatible for 400kV, 1Cx800sqmm, Copper Conductor XLPE cable	Sealing/ termination kit shall be complete in all respect and comprising of following but not limited to, 1. Outdoor cable sealing/ termination ends shall be located in the pothead yard to connect with outdoor Current Transformer emanating from the yard. 2. The housing of the outdoor sealing end shall be porcelain/ epoxy resin of uniform quality and shall have sufficient strength against mechanical, electrical and thermal stresses and it shall confirm to IEC 61442/ 60840. 3. The colour of porcelain / epoxy resin insulator shall be brown and the minimum creepage distance in millimeters per unit of the highest voltage shall be more than 25 mm / kV. 4. Cable end terminating kits shall be outdoor type and suitable for the size of conductor, insulation and voltage/ current ratings of the cable. 5. Any other item/(s) such as weather shields/ sealing ends, Copper lugs/ connector suitable for size of conductor, Non-magnetic glands, hardware and other accessories required to complete the supply in all respect but not limited to above shall be in bidder's scope. (1 Set= 1-phase termination requirements)	Set	6
6	1nox3-phase Disconnecting Link Box (CCPU) with SVL at GIS end side	Disconnecting link box/ cable covering protective unit (CCPU) shall be complete in all respect and comprising of following but not limited to, 1. The GIS end side Disconnecting link box/ Cable Covering Protective Unit (CCPU) shall be provided with sheath voltage limiter (SVL), which shall be of non-linear resistor type and shall be made of zinc oxide compound. 2. Construction and materials of bonding cable shall comply with relevant IEC or equivalent standards and the cross-sectional area shall have enough size to withstand the specified short circuit rating i.e. 40kA for 1 sec of the cable system. 3. Any other item/(s) including lugs, outoor shrouds, mounting structure etc. required to complete the supply in all respect but not limited to above shall be in bidder's scope. (1 Set= 1-phase)	Set	2
7	1x1-phase Disconnecting Link Box (CCPU) without SVL at Cable Sealing end side	Disconnecting link box/ cable covering protective unit (CCPU) shall be complete in all respect and comprising of following but not limited to, 1. The Cable Sealing end side Disconnecting link box/ Cable Covering Protective Unit (CCPU) shall be provided to disconnect the earthing circuit during testing, hence it shall be without sheath voltage limiter (SVL). 2. Construction and materials of bonding cable shall comply with relevant IEC or equivalent standards and the cross-sectional area shall have enough size to withstand the specified short circuit rating i.e. 40kA for 1 sec of the cable system. 3. Any other item/(s) including lugs, outoor shrouds/ covers, mounting structure etc. required to complete the supply in all respect but not limited to above shall be in bidder's scope. (1 Set= 1-phase)	Set	6

ANNEXURE 1- BOQ for 400kV XLPE Cable & its Accessories

Rev No. 00

Sl. No.	Item Description	Long Description	Unit	Qty.
8	Support Structure at GIS end and Rack Assembly Structure for installation of cable CVT/ Pothead Yard/ GIS Bulding	Support Structure at GIS end and Rack Assembly Structure for installation of cable CVT/ Pothead Yard/ GIS Bulding shall be complete in all respect and comprising of following but not limited to, 1. Support Structure at GIS end and Rack Assembly Structure for complete route shall have sufficient strength to cater to the static & dynamic loads. 2. The zinc coating shall be uniform, clean, smooth and free from spangle as possible, and shall weigh not less than 0.61 Kg/m2 over the area covered and not less than 0.09 mm in thickness. 1. All structural materials including hardware/ insert plate/ anchor fastener for assembly and fixing with wall/ trench etc. required to complete the work in all respects shall be in bidder's scope.	MT	30
9	1-way aluminium/ non-magnetic clamp compatible for 400kV, 1Cx800sqmm, Copper Conductor XLPE cable	Single-way aluminium/ non-magnetic clamp shall be complete in all respect and comprising of following but not limited to, 1. The rising portion of cables at both ends (bent portion) and the intermediate portion shall be clamped with single way aluminium clamps and it shall be fixed at 2.0 meter distance/ in line with short circuit force calculation. 2. The material of cleats shall be aluminium alloy in accordance with relevant IEC/IS or equivalent standards. 3. Any other item/(s) such as mounting/ fixing hardware/ materials with racks assembly and other accessories required to complete the supply in all respect but not limited to above shall be in bidder's scope.	No	2200
10	Miscellaneous Items required for 400kV XLPE cable system	All Miscellaneous Items shall be complete in all respect and comprising of following but not limited to, 1. Items including cable route marker, suitable earthing materials (earthing electrode, earthing terminals, bi-metallic clamps, washers, lugs, pads, hardware etc.) for connection to ground mat risers/ electrode, aluminium blocks for cable snaking, cable spacers, cable suspension devices, cable identification tags, embedments, hardwares etc. 2. Bidder shall submit the list covering the complete requirements. (1Lot=complete requirement for package)	Lot	1
11	Consumables with limited shelf life required for 400kV XLPE cable system	All consumables required to complete the work in all respects shall be in bidder's scope. 1. All consumable materials including wiper, solvent for cleaning, tissue paper etc. and other repair materials for outer sheath etc. shall be supplied. 2. Bidder shall submit the list covering the complete requirements. (1Lot=complete requirement for package)	Lot	1
12	Tools, tackles & equipment required for operation and maintenance of 400kV XLPE cable system	All consumables required to complete the work in all respects shall be in bidder's scope. 1. The bidder shall supply two sets of hand tools alongwith racks for holding them in new and unused condition to be used only for the maintenance of the cables and accessories during its useful life. 2. Bidder shall submit the list covering the complete requirements. (1Lot=complete requirement for package)	Lot	1
	Supply Item: Tools & tackles			
13	Hand tools along with rack	Hand tools shall be provided for maintennace of cables and its accessories during its useful life. A list of such maintenance tools & tackles shall be provided during detailed engineering.	Set	2
B	**Supply Item: Mandatory Spares**			
1	Bonding cable along with accessories	Technical requirements shall be same as main item. Please refer clause 11.15 for complete details.	Running Meter	100
2	400kV, Indoor GIS Sealing/ Termination End Kit, compatible for 400kV, 1Cx800sqmm, Copper conductor, XLPE cable	Technical requirements shall be same as main item. Please refer clause 11.15 for complete details.	Set	2
3	400kV, Outdoor Cable Sealing/ Termination End Kit, compatible for 400kV, 1Cx800sqmm, Copper Conductor XLPE cable	Technical requirements shall be same as main item. Please refer clause 11.15 for complete details.	Set	2
4	400kV, Straight Through Jointing kit, compatible for 400kV, 1Cx800sqmm, Copper Conductor XLPE cable	Straight through jointing kit shall be complete in all respect and comprising of following but not limited to, 1. The cable end terminating kits shall be dry type and suitable for the size of conductor, insulation and voltage/ current ratings of the cable and installation conditions. 2. The jointing kit shall be heat shrinkable type and shall be used for jointing of cables. 3. The jointing kit shall be suitable for Copper cables and to be provided with copper jointing ferrules. 4. Any other items/accessories required to complete the supply in all respects but not limited to above shall be in bidder's scope. (1 Set= 1-phase termination requirements) Please refer clause 11.15 for complete details.	Set	1
5	1nox3-phase Disconnecting Link Box (CCPU) with SVL at GIS end side	Technical requirements shall be same as main item. Please refer clause 11.15 for complete details.	Set	2
6	1nox1-phase Disconnecting Link Box (CCPU) without SVL at Cable Sealing end side	Technical requirements shall be same as main item. Please refer clause 11.15 for complete details.	Set	6
7	Additional spare item over and above mandatory spares of 400kV XLPE cable system	1. Bidder to consider necessary spare item over and above mandatory spares for five years of normal operation and maintenance for 400kV XLPE system. 2. Bidder shall submit the list covering the complete requirements. Please refer clause 11.15 for complete details.	Lot	1

ANNEXURE- BOQ for Service of 400kV XLPE Cable & its Accessories

Rev No. 00

Sl. No.	Item Description	Unit	Qty.
C.	**Service Item: Cable**		
1	Service Item: Cable- Site survey for route & length finalization of 400kV, 1Cx800sqmm Copper conductor, XLPE cable, The exact cable length shall be finalized after visiting site & making precise measurements at contract stage. Manufacturing lengths and drum length shall be determined with consultation & approval with BHEL/ Customer/ Consultant. 1. The payment of cables lengths for supply shall be as per approved quantities after survey. 2. The Payment of cables length for installation shall be as per actual measurement at site which shall also include cable terminations. 3. The length may vary by -20% to +20% at contract stage based on actual measurement at site and calculations submitted by the bidder. (1Lot=Complete requirement for package)	Lot	1
2	Service Item: Cable- Unloading and verification of 400kV XLPE cables and its accessories at site and shifting to BHEL store, Site visit for unloading & verification of materials for proper storage and up-keeping at site includes following activities but not limited to, 1. Complete and safe unloading of 400kV XLPE cables and its accessories at site. 2. Reconciliation, storage & upkeeping of materials for long storage (min. two years) 3. Further watch & ward shall be under the scope of BHEL/ its contrcator, till the materials are in BHEL store.	Lot	1
3	Service Item: Cable- Installation of 400kV, 1Cx800sqmm Copper conductor, XLPE cable, Installation of Copper conductor XLPE cable shall be complete in all respect and comprising of following but not limited to, 1. Laying of cables in horizontal/ vertical/ bent plane in flat form with proper dressing by fixing single clamps as and where required on support structure at ends/ rack assembly/ other structure assembly in tunnel. 2. Arrangement of all special tools & tackles for smooth laying & installation on returnable basis. 3. Cable tags/ marking tags, cable spacers, aluminum blocks for snaking, repair material for outer sheath, cable suspension devices, harwares shall be arranged and provided. 4. Arrangement of sand bags/ any other temporary arrangement shall be provided by bidder. 5. Any other service/(s) required to complete the work in all respects but not limited to above shall be in bidder's scope.	Running meter	4200
4	Service Item: Cable- Installation of bonding cable along with accessories, Installation of bonding cable shall be complete in all respect and comprising of following but not limited to, 1. Bonding cable shall be installed from metallic sheath of XLPE insulated power cables to respective disconnecting link box and then to earth grid. 2. Laying of bonding cables shall be in horizontal/ vertical/ bent plane in flat form with proper dressing by fixing suitable single clamps as and where required on support structure at ends/ rack assembly/ other structure assembly in tunnel. 3. Fixing of cable support structure for supporting termination including fixing arrangements including any other accessories. 4. Any other item/(s) including lugs/ connectors and other accessories required to complete the service shall be in bidder's scope.	Running meter	100
5	Service Item: Cable- Installation of earthing continuity cable along with accessories, Installation of Earthing continuity cable shall be complete in all respect and comprising of following but not limited to, 1. Earthing continuity cable shall be installed between disconnecting links of both ends. 2. Laying of earthing continuity cable shall be in horizontal/ vertical/ bent plane in flat form with proper dressing by fixing suitable single clamps as and where required on support structure at ends/ rack assembly/ other structure assembly in tunnel. 3. Fixing of cable support structure for supporting termination including fixing arrangements including any other accessories. 4. Any other item/(s) including lugs/ connectors and other accessories required to complete the service shall be in bidder's scope.	Running Meter	1400

ANNEXURE- BOQ for Service of 400kV XLPE Cable & its Accessories

Rev No. 00

Sl. No.	Item Description	Unit	Qty.
6	Service Item: Cable- Site/ field testing & commissioning of 400kV, 1Cx800sqmm Copper conductor, XLPE cable system, Field testing & commissioning of Copper conductor XLPE cable shall be complete in all respect and comprising of following but not limited to, 1. Field testing & commissioning of XLPE, Cu conductor cable along with accessories such end termination, straight through joints, if required shall be carrried out in phase manner and hence simultaneous commissioning of all the circuits is not envisaged. 2. Field testing & commissioing shall be done as per approved SAT (site acceptance test), which shall be submitted by bidder and shall be approved by BHEL/ Customer/ Consultant. 3. Field testing & commissioning shall be carried out by skilled & experienced testing engineer. Test instruments including HV AC/ DC testing kit and partial discharge measurement equipment, if applicable along with valid calibration certificates for testing & commissioning shall be brought at site by bidder. 4. Any other service/(s) required to complete the testing & commissioning in all respects shall be in bidder's scope. (1 circuit-no= 1 no of Feeder including spare run of cable)	Circuit-no	2
7	Service Item: Cable Accessories- Termination of 400kV, Indoor GIS Sealing/ Termination End Kit, compatible for 400kV, 1Cx800sqmm, Copper conductor, XLPE cable, Termination of Indoor GIS Sealing/ Termination End Kit shall be complete in all respect and comprising of following but not limited to, 1. Termination work shall include all necessary arranngement for access and working such as scaffolding, heighteneded platform, temporary tent with controlled climate etc. 2. Termination/ jointing of cables shall be done by skilled and experienced jointer duly certified by OEM and approved by BHEL/ consultant/ customer. 3. Any other service/(s) required to complete the work in all respect but not limited to above shall be in bidder's scope. (1 set= 1-phase termination work)	Set	6
8	Service Item: Cable Accessories- Termination of 400kV, Outdoor Cable Sealing/ Termination End Kit, compatible for 400kV, 1Cx800sqmm, Copper Conductor XLPE cable, Termination of Outdoor Cable Sealing/ Termination End Kit shall be complete in all respect and comprising of following but not limited to, 1. Termination work shall include all necessary arranngement for access and working such as scaffolding, heighteneded platform, temporary tent with controlled climate etc. 2. Termination/ jointing of cables shall be done by skilled and experienced jointer duly certified by OEM and approved by BHEL/ consultant/ customer. 3. Any other service/(s) required to complete the work in all respect but not limited to above shall be in bidder's scope. (1 set= 1-phase termination work)	Set	6
9	Service Item: Cable Accessories- Jointing of 400kV, Straight Through Jointing kit, compatible for 400kV, 1Cx800sqmm, Copper Conductor XLPE cable, Jointing of Straight Through Jointing kit shall be complete in all respect and comprising of following but not limited to, 1. Termination work shall include all necessary arranngement for access and working such as temporary tent with controlled climate etc. 2. Termination/ jointing of cables shall be done by skilled and experienced jointer duly certified by OEM and approved by BHEL/ consultant/ customer. 3. Any other service/(s) required to complete the work in all respect but not limited to above shall be in bidder's scope. 4. This is optional item and it shall be done at site as per requirement. (1 set= 1-phase termination work)	Set	1
10	Service Item: Cable Accessories- Installation of 1nox3-phase Disconnecting Link Box (CCPU) with SVL at GIS end side, Installation of Disconnecting Link Box (CCPU) with SVL shall be complete in all respect and comprising of following but not limited to, 1. Installation of Disconnecting Link Box (CCPU) with SVL along with accessories such as suitable earthing arrangements(earthing electrode, earthing terminals, bi-metallic clamps, washers, lugs, pads, hardware etc.) and structural work for mounting. 2. Any other service/(s) required to complete the work in all respects but not limited to above shall be in bidder's scope.	Set	2

ANNEXURE- BOQ for Service of 400kV XLPE Cable & its Accessories

Rev No. 00

Sl. No.	Item Description	Unit	Qty.
11	Service Item: Cable Accessories- Installation of 1nox1-phase Disconnecting Link Box (CCPU) without SVL at Cable Sealing end side, Installation of Disconnecting Link Box (CCPU) without SVL shall be complete in all respect and comprising of following but not limited to, 1. Installation of Disconnecting Link Box (CCPU) without SVL along with accessories such as suitable earthing arrangements (earthing electrode, earthing terminals, bi-metallic clamps, washers, lugs, pads, hardware etc.) and structural work for mounting. 2. Any other service/(s) required to complete the work in all respect but not limited to above shall be in bidder's scope.	Set	6
12	Service Item: Cable Accessories- Installation of Support Structure at GIS end and Rack Assembly Structure for of cable CVT/ Pothead Yard/ GIS Bulding Installation of Support Structure at GIS end and Rack Assembly Structure in Cable CVT/ Pothead Yard/ GIS Bulding shall be carried out in all respect and comprising of following but not limited to, 1. Support Structure and Rack Assembly Supports shall have sufficient strength to cater to the static & dynamic loads. 2. The zinc coating shall be uniform, clean, smooth and free from spangle as possible, and shall weigh not less than 0.61 Kg/m2 over the area covered and not less than 0.09 mm in thickness. 1. All structural materials including hardware for assembly and fixing with wall/ trench etc. required to complete the work in all respects shall be in bidder's scope. (1 Cable Circuit= Complete structure requirement for 1 cable circuit)	MT	30
13	Service Item: Training - Training for 400kV XLPE System of 6no. Engineers (4 no. customer engineers+2 no. BHEL engineers) for a period of at least 7 working days at Manufacturer's works, To and fro travelling charges, lodging and boarding charges of engineer shall be in BHEL/THDC scope. Only training shall be arranged at Bidder works.	Lot	1

1098921/2022/TBG-TB_ENGG_PA

Annexure 2- Details for Lot wise Technical Clearance for Manufacturing

PROJECT NAME **Vishnugad Pipalkoti Hydro Electric project (4X111MW)**
CUSTOMER **M/s THDC India Limited, Rishikesh, Uttarakhand**
ITEM DESCRIPTION **400kV XLPE Cable & accessories**

Sl. No.	BHEL/ Customer Drawing/ Doc. No	Vendor Drawing/ Doc. No	Document Title	Approval Category (A- approval, I-Information)	Manufacturing Lot	Submission date	Remarks
1	TB-382-316-36-01	--	400kV XLPE Cable Cable Cross Section Drawings and Guaranteed Technical particulars	A	1		1. BHEL shall provide all the technical inputs requirements (e.g. Title Block, Master Drawing list, Layout Plan & Section Drawings, interfacing drawings etc. as applicable) required for submission of drawings/ documents during detailed engineering stage within time line mentioned in activity schedule, pendancy of any input from BHEL, if equired, bidder shall inform within one week time. Subsequent to this Bidder shall provide all drawing/ document within time line mentioned in Activity Schedule. However it is to be noted that total submission time for all drawing/ documents of particular lot shall not exceed time line mentioned in activity schedule of NIT. 2. Submisison date furnished by bidder shall be used for any of contractual requirements/ purpose.
2	TB-382-316-36-02	--	400kV XLPE Cable Type Test Reports	A/I	1		
3	TB-382-316-36-03	--	Bonding/ Earthing Cable Cross Section Drawings and Guaranteed Technical particulars	A	1		
4	TB-382-316-36-04	--	Circuit Single Line Diagram including earthing details, Dimensional and Layout Arrangment (Plan & Section) in Cable Tunnel/ Other Area for 400kV XLPE Cable System	A	1		
5	TB-382-316-36-05	--	Cable Cutting & Cable Drum Schedule for 400kV XLPE & Bonding/ Earthing Cable	A	1		
6	TB-382-316-36-06	--	400kV XLPE Cable Design and Sizing Calculations	A/I	1		
7	TB-382-316-36-07	--	400kV XLPE Cable Earthing/ sheath voltage limitation (Voltage Gradient) Calculations	A/I	1		
8	TB-382-316-36-08	--	400kV XLPE Temperature Rise & Heat Loss Calculations	A/I	1		
9	TB-382-316-36-09	--	400kV XLPE Sizing calculation & short circuit withstand capabilities of Metallic Sheath.	A/I	1		
10	TB-382-316-36-10	--	GA Drawing and Guaranteed Technical Particulars of Cable Drum for 400kV XLPE & Bonding/ Earthing Cable	A	1		
11	TB-382-316-36-11	--	Quality Assurance Plan & Inspection Test Schedule of 400kV XLPE Cable and its accessories	A	1 & 2		
12	TB-382-316-36-12	--	GA Drawing and Guaranteed Technical particulars of 400kV Jointing and Termination Kits	A	2		
13	TB-382-516-36-13	--	Type Test Report of 400kV Jointing and Cable Termination Kit	A/I	2		
14	TB-382-316-36-14	--	GA Drawing, Guaranteed Technical Particulars and Bill of Materials of Link Box	A	2		
15	TB-382-516-36-15	--	Type Test Report of Link Box	A/I	2		
16	TB-382-516-36-16	--	GA Drawing, Guaranteed Technical particulars and Bill of Materials of Single Clamps and other Miscellaneous Items (Earthing materials, aluminium blocks for cable snaking, cable spacers, cable suspension devices, cable identification tags, embedments, hardwares etc.)	A/I	*		
17	TB-382-516-36-17	--	List of Consumables items for 400kV XLPE Cable System, if applicable	A/I	*		
18	TB-382-516-36-18	--	List of Tools, tackles & Equipment required for operation and maintenance of 400kV XLPE Cable System, if applicable	A/I	*		
19	TB-382-316-36-19	--	Design Calculation, GA Drawing and Bill of Materials for GIS end Support Structure	A/I	*		
20	TB-382-316-36-20	--	Design Calculation, GA Drawing and Bill of Materials for GIS end Support Structure	A/I	*		
21	TB-382-316-36-21	--	400kV XLPE Cable Loading Distribution on Foundation/ Support Structure	A/I	*		

Lot Description	Item Sl. No. as per BOQ	Remarks
Lot 1	A.1, A.2, A.3,	Covered under separate & dedicated purchase/ work indent request.
Lot 2	A.4, A.5, A.6, A.7	
Lot 3/ Separate Lot	B	Covered under separate & dedicated purchase request.

Notes:

1 Drawing/ document marked **"*"** shall not be considerd for Engineering Delay Analysis.

2 Materials such as Single Clamp, other miscellaneous items, Structures & hardware, Consumables, Hand Tools etc. shall not be considered for Engineering Delay Analysis, However, bidder shall ensure timely supply, availability and completeness of work at site without any delay.

3 Drawings/ documents, not mentioned above but required for completeness of work shall be submitted for approval/ Information, if required. However, bidder/ vendor shall ensure that manufacturing of any materials of 400kV XLPE cable system are not getting affected/ put on-hold.

4 In case drawing/ document are not duly stamped in category-1/ category-2 by customer, BHEL stamp/ confirmation shall be treated final to proceed further.

Annexure 3- Scope Division Matrix between BHEL/its contractor & Bidder/ Vendor

PROJECT NAME: Vishnugad Pipalkoti Hydro Electric project (4X111MW)
CUSTOMER: M/s THDC India Limited, Rishikesh, Uttarakhand

Sl. No.	Activity Schedule	Customer/ THDCIL	BHEL/ its contractor	Bidder/ Vendor	Remarks
A.	**Design & supply work**				
1	XLPE Power Cables			O	
2	Bonding Cable & Earth Continuity Cables			O	
3	Jointing Kits & Termination Kits for XLPE Cables			O	
4	Link Boxes (CCPU) for XLPE Cables			O	
5	One way non-magnetic single clamps			O	
6	GIS end termination (in GIS building)				
	- Steel structure for supporting the termination work			O	
	- Cover plate/ scaffoldig for supporting cable during termination work			O	
	- Suitable clamps at termination area			O	
	- Earthing shrouds/ sleeve and any other arrangements			O	
	- Terminal lugs, if applicable			O	
	-Other miscellaneous items i.e. phase identification, cable tags, fire retardant paint/ outer shrouds, earthing materials etc.			O	
7	Cable Sealing end termination (at pothead yard)				
	- Steel structure for supporting the termination work			O	
	- Cover plate/ scaffoldig for supporting cable during termination work			O	
	- Suitable clamps at termination area			O	
	- Earthing shrouds/ sleeve and any other arrangements			O	
	- Terminal lugs, if applicable			O	
	-Other miscellaneous items i.e. phase identification, cable tags, fire retardant paint/ outer shrouds, earthing materials etc.			O	
8	XLPE Cable ventilation and tunnel area/ XLPE cable route area				
	- Support structure including hanger and rack assembly including anchor fastener/ inserts throughtout the route			O	
	-Miscellaneous items including phase identification, cable tags, fire retardant paint/ outer shrouds, earthing materials etc.			O	
9	Consumables for XLPE cable installation, termination and repair work			O	Detailed list shall be submitted.
10	Mandatory spares			O	
11	Tools for XLPE cable maintenance work			O	Detailed list shall be submitted.
12	Tools and plants for XLPE cable installation and laying work			O	Returnable basis. Detailed list shall be submited.
13	Tools and plants for XLPE cable testing and commissioning work			O	Returnable basis. Detailed list shall be submited.
14	Tools and plants for XLPE cable jointing and terminaton work			O	Returnable basis. Detailed list shall be submited.
B.	**Installation work**				
1	Unloading of all XLPE cable materials and its accessories at BHEL store			O	Open/ closed store shall be provided by BHEL.
2	Installation of steel structures including rack assembly/ hanger/ support structure on concrete wall/ concerete foundation throughout CVT area/ cable route area			O	Structure shall be installed anchor fasteners/ inserts plats
3	Laying and installation of XLPE power cables with proper dressing, snaking and application of fire retardant paint/ coating, if applicable etc.			O	
4	Clamping of XLPE cables with suitable clamps			O	
5	Termination work for XLPE power cables at GIS end			O	Support shall be extended by GIS OEM in GIS termination work
6	Termination work for XLPE power cables at Cable Sealing end			O	
7	Installation and fixing of Link Boxes on the Wall/ Steel Structures			O	
8	Laying and installation of bonding and ECC cables between Link Boxes			O	
9	Earthing work throughout in CVT area/ cable route area			O	
C.	**Testing & commissioning work**				
1	AC Voltage Test of the insulation, if applicable			O	
2	DC Voltage Test on the outer sheath			O	
3	Partial discharge test			O	
4	24-hour AC cable soak (no load) test at rated voltage			O	
5	Temporary Test Bushing for Commissioning Test		O		
6	Gas/ oil Work for Commissioning Test			O	
D.	**Civil Works**				
1	Civil works for CVT/ cable laying route	O			
2	Civil works for foundation of cable sealing end.	O			
3	Civil works at GIS end, if any	O			
D.	**Others works**				

Annexure 3- Scope Division Matrix between BHEL/its contractor & Bidder/ Vendor

PROJECT NAME: Vishnugad Pipalkoti Hydro Electric project (4X111MW)
CUSTOMER: M/s THDC India Limited, Rishikesh, Uttarakhand

Sl. No.	Activity Schedule	Customer/ THDCIL	BHEL/ its contractor	Bidder/ Vendor	Remarks
1	Local transportation for vendor/ bidder officials, supervisory staffs and workers			O	
2	Local transportation of Equipment/ tools/ consumable materials			O	
3	Transportation of all XLPE cable materials inclduing drums and other Materials from Site to Site and from BHEL store yard to Site			O	
4	All Necessary Scaffolding for making platform, Tarpolin for temporary covering, AC for controlled environment and jointing container for jointing tools & tackles etc.			O	
5	BHEL store/ XLPE cable store yard with security arrangement		O		
6	Site area with security arrangement			O	
7	All Necessary permission for gatepass, identity card and work pass			O	
8	Provision of Heavy Equipment for Termination & Commisioning work (Crane, manlift etc.), if required			O	
9	Provision of construction power supply for termination Work			O	
10	Disposal of Waste Materials including empty cable drums and other materials			O	

Notes:

1. Additional/ multiple visits/ idling time are required due unxpected condition/ force majeure/ not attributable to vendor/ bidde, there shall not be any additional payment for the same.

FIRST ANGLE PROJECTION (ALL DIMENSIONS ARE IN MM.)

DRAWING No. TB-3-382-510-001

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COMPUTER DRG. PATH NAME :

REF. DRG. No.

SIGN. & DATE

INVENTORY No.

420kV GIS

BUS VT

BUS-VTB

BUS-89BE

BUS-89B

420kV BUS-B 2000A, 40KA, 1Sec

420kV BUS-A 2000A, 40KA, 1Sec

401 89B / 401 89AE / 401 89A

401 CT1 / 401 52 / 401 CT2 / 401 89T1E1 / 401 89T1 / 401 89T1E2 / 401 LA

402 89B / 402 89AE / 402 89A

402 CT1 / 402 52 / 402 CT2 / 402 89T1E1 / 402 89T1 / 402 89T1E2 / 402 LA

403 89B / 403 89BE / 403 89AE / 403 89A

403 CT1 / 403 52 / 403 CT2

489BE / 489AE

BUS-89A / BUS-89AE / BUS-VTA

404 89B / 404 89AE / 404 89A

404 CT1 / 404 52 / 404 CT2 / 404 89T1E1 / 404 89T1 / 404 89T1E2 / 404 LA

405 89B / 405 89AE / 405 89A

405 CT1 / 405 52 / 405 CT2 / 405 89L1E1 / 405 89L1 / 405 89L1E2 / 405 LA1

406 89B / 406 89AE / 406 89A

406 CT1 / 406 52 / 406 CT2 / 406 89T1E1 / 406 89T1 / 406 89T1E2 / 406 LA

407 89B / 407 89AE / 407 89A

407 CT1 / 407 52 / 407 CT2 / 407 89L1E1 / 407 89L1 / 407 89L1E2 / 407 LA1

SF6 TO OIL BUSHING

SF6,INDOOR CSE

CU/XLPE CABLE 400KV 800SQMM

OUTDOOR CSE

405 CTL / 405 89L2E1 / 405 89L2 / 405 89L2E2 / (2PH. ONLY) 405-WT / 405-CVT / 405-LA

407 CTL / 407 89L2E1 / 407 89L2 / 407 89L2E2 / (2PH. ONLY) 407-WT / 407-CVT / 407-LA

GT-4
13.8kV/(420/SQRT3)
1PH., 46MVA x3
%Z 12.5±10%
YNd11

GT-3
13.8kV/(420/SQRT3)
1PH., 46MVA x3
%Z 12.5±10%
YNd11

GT-2
13.8kV/(420/SQRT3)
1PH., 46MVA x3
%Z 12.5±10%
YNd11

GT-1
13.8kV/(420/SQRT3)
1PH., 46MVA x 3
%Z 12.5±10%
YNd11

GT-4 | GT-3 | BUS COUPLER | BUS VT | GT-2 | LINE-2 | GT-1 | LINE-1

REV.	DATE		
06	28.07.20	ALTERED	SK
		CHECKED	MLK/SKS
		APPROVED	AG
ZONE	AS PER CUSTOMER CORRESPONDENCE		

REV.	DATE		
07	19.11.20	ALTERED	SK
		CHECKED	MLK/SKS
		APPROVED	AG
ZONE	AS PER CUSTOMER CORRESPONDENCE		

REV.	DATE		
05	03.05.19	ALTERED	SK
		CHECKED	MLK/SKS
		APPROVED	AG
ZONE	AS PER CUSTOMER LETTER DATED 01.05.2019		

REV.	DATE		
04	08.04.19	ALTERED	SK –SD–
		CHECKED	MLK/SKS –SD–
		APPROVED	AG –SD–
ZONE	AS PER CUSTOMER LETTER DATED 29.03.2019		

REV.	DATE		
03	28.01.19	ALTERED	
		CHECKED	SK/VK –SD–
		APPROVED	DM/AG –SD–
ZONE	1. DISCONNECTOR AND EARTH SWITCH INCLUDED IN GT CIRCUIT 2. BAY SEQUENCE CHANGED		

REV.	DATE		
02	04.05.16	ALTERED	
		CHECKED	SK/AA/VK –SD–
		APPROVED	AS/RS –SD–
ZONE	AS PER THDC COMMENT LETTER DATED 16.04.16		

REV.	DATE		
01	22.03.16	ALTERED	
		CHECKED	SK/AA/VK –SD–
		APPROVED	AS/RS –SD–
ZONE	AS PER THDC COMMENT LETTER DATED 15.02.16		

ADDITIONAL INFORMATION
W.O.No. 84008

STATUS OF DRAWING

DISTRIBUTION OF PRINTS

ग्राहक/परियोजना का नाम
NAME OF CUSTOMER/PROJECT

THDC INDIA LTD.
4X111MW VISHNUGAD PIPALKOTI H.E. PROJECT

भारत हेवी इलेक्ट्रिकल्स लिमिटेड
पारेषण व्यापार समूह
BHARAT HEAVY ELECTRICALS LTD.
TRANSMISSION BUSINESS GROUP

	नाम /NAME	हस्ता./SIGN.	दि./DATE
बनाया DRAWN	DM	–SD–	19.01.16
जाँचा CHECKED	SK/AA/VK	–SD–	
स्वीकृत APPROVED	AS/SK	–SD–	

विभाग DEPT. TBEM
कोड CODE 422

अनुपात / SCALE --

कार्ड कोड CARD CODE -

शीर्षक/TITLE
SINGLE LINE DIAGRAM
OF 400KV GIS & POTHEAD

ड्राईंग क्र./DRAWING NO. TB-3-382-510-001

पुनः/REV. 07

पृष्ठ क्र./SHEET No. 1 | अगला पृष्ठ/NEXT SHEET 3

A3 SIZE

FIRST ANGLE PROJECTION (ALL DIMENSIONS ARE IN MM.)

DRAWING No. TB-3-382-510-001

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COMPUTER DRG. PATH NAME :

REF. DRG. No.

SIGN. & DATE

INVENTORY No.

A. 400KV GIS LINE FEEDER CT PARAMETER (BAYS 405 & 407): CT1(Bus Side)

Core No.	Current Ratio	Accuracy Class	Min VA Burden at lowest Ratio	Min kPV (V)	Max RCT in Ohms	Max Im at kPV (mA)	Purpose
1	2000-1000-500 / 1	5P20	10	-	-	-	SPARE
2	2000-1000-500 / 1	PS	-	2000-1000-500	10-5-2.5	30-60-120	XLPE Cable Diff. Protection
3	2000-1000-500 / 1	PS	-	2000-1000-500	10-5-2.5	30-60-120	XLPE Cable Diff. Protection

B. 400KV GIS LINE FEEDER CT PARAMETER (BAYS 405 & 407): CT2 (Line Side)

Core No.	Current Ratio	Accuracy Class	Min VA Burden at lowest Ratio	Min kPV (V)	Max RCT in Ohms	Max Im at kPV (mA)	Purpose
1	2000-1000-500 / 1	0.2S ISF≤ 5	20	-	-	-	Metering
2	2000-1000-500 / 1	PS	-	2000-1000-500	10-5-2.5	30-60-120	Busbar Differential Protn/LBB
3	2000-1000-500 / 1	PS	-	2000-1000-500	10-5-2.5	30-60-120	Busbar Differential Protn/LBB
4.	2000-1000-500 / 1	PS	-	2000-1000-500	10-5-2.5	30-60-120	SPARE

C. 400KV GIS GT#1,2,3,4 CT PARAMETER (BAYS 401, 402, 404 & 406): CT1(Bus Side)

Core No.	Current Ratio	Accuracy Class	Min VA Burden at lowest Ratio	Min kPV (V)	Max RCT in Ohms	Max Im at kPV (mA)	Purpose
1	500 / 1	5P20	10	-	-	-	SPARE
2	500 / 1	PS	-	(160Rct+280)	-	120	SPARE
3	500 / 1	PS	-	(200Rct+470)	-	120	Transformer Overall Diff. Protn.

D. 400KV GIS GT#1,2,3,4 CT PARAMETER (BAYS 401, 402, 404 & 406): CT2 (GT Side)

Core No.	Current Ratio	Accuracy Class	Min VA Burden at lowest Ratio	Min kPV (V)	Max RCT in Ohms	Max Im at kPV (mA)	Purpose
1	2000-1000-500 / 1	PS	-	2000-1000-500	10-5-2.5	30-60-120	Busbar Differential Protn/LBB
2	2000-1000-500 / 1	PS	-	2000-1000-500	10-5-2.5	30-60-120	Busbar Differential Protn/LBB
3	500 / 1	0.2S ISF≤ 5	20	-	-	-	Metering
4.	500 / 1	PS	-	(160Rct+250)	-	120	GT REF Protn.
5.	500 / 1	PS	-	(160Rct+280)	-	120	Transformer Diff. Protection

E. 400KV GIS BUS COUPLER CT PARAMETER (BAYS403): CT1(Bus–B Side)

Core No.	Current Ratio	Accuracy Class	Min VA Burden at lowest Ratio	Min kPV (V)	Max RCT in Ohms	Max Im at kPV (mA)	Purpose
1	2000-1000-500 / 1	5P20	10VA	-	-	-	Overcurrent and Earth Fault
2	2000-1000-500 / 1	PS	-	2000-1000-500	10-5-2.5	30-60-120	Busbar Differential Protn/LBB
3	2000-1000-500 / 1	PS	-	2000-1000-500	10-5-2.5	30-60-120	Busbar Differential Protn/LBB

F. 400KV GIS BUS COUPLER CT PARAMETER (BAYS403): CT2(Bus–A Side)

Core No.	Current Ratio	Accuracy Class	Min VA Burden at lowest Ratio	Min kPV (V)	Max RCT in Ohms	Max Im at kPV (mA)	Purpose
1	2000-1000-500 / 1	0.2S ISF≤5	20	-	-	-	METERING.
2	2000-1000-500 / 1	PS	-	2000-1000-500	10-5-2.5	30-60-120	Busbar Differential Protn/LBB
3	2000-1000-500 / 1	PS	-	2000-1000-500	10-5-2.5	30-60-120	Busbar Differential Protn/LBB
4	2000-1000-500 / 1	PS	-	2000-1000-500	10-5-2.5	30-60-120	SPARE

G. 400KV POTHEAD YARD LINE BAY CT PARAMETER (BAYS405 & 407): CTL

Core No.	Current Ratio	Accuracy Class	Min VA Burden at lowest Ratio	Min kPV (V)	Max RCT in Ohms	Max Im at kPV (mA)	Purpose
1	2000-1000-500 / 1	PS	-	4000-2000-1000	10-5-2.5	30-60-120	Line Distance Protn.
2	2000-1000-500 / 1	PS	-	4000-2000-1000	10-5-2.5	30-60-120	Line Distance Protn.
3	2000-1000-500 / 1	0.2S ISF≤5	20VA	-	-	-	METERING
4	2000-1000-500 / 1	PS	-	2000-1000-500	10-5-2.5	30-60-120	XLPE Cable Diff. Protection
5	2000-1000-500 / 1	PS	-	2000-1000-500	10-5-2.5	30-60-120	XLPE Cable Diff. Protection

H. 400KV GIS BUS VT : VTA & VTB

Core No.	Ratio	Accuracy Class	Burden
1	400/√3 KV / 110/√3V	0.2	100VA
2	400/√3 KV / 110/√3V	3P	75VA
3	400/√3 KV / 110/√3V	3P	75VA

I. Outdoor 400kv Line CVT (Bay 405 & 407): 4400pF

Core No.	Ratio	Accuracy Class	Burden
1	400/√3 KV / 110/√3V	3P	200VA
2	400/√3 KV / 110/√3V	3P	200VA
3	400/√3 KV / 110/√3V	0.2	100VA

REV.	DATE		
08	28.07.20	ALTERED	SK
		CHECKED	MLK/SKS
		APPROVED	AG
ZONE	AS PER CUSTOMER CORRESPONDENCE		

REV.	DATE		
07	19.11.20	ALTERED	SK
		CHECKED	MLK/SKS
		APPROVED	AG
ZONE	AS PER CUSTOMER CORRESPONDENCE		

REV.	DATE		
05	03.05.19	ALTERED	SK
		CHECKED	MLK/SKS
		APPROVED	AG
ZONE	AS PER CUSTOMER LETTER DATED 01.05.2019		

REV.	DATE		
04	08.04.19	ALTERED	SK –SD–
		CHECKED	MLK/SKS –SD–
		APPROVED	AG –SD–
ZONE	AS PER CUSTOMER LETTER DATED 29.03.2019		

REV.	DATE		
03	28.01.19	ALTERED	
		CHECKED	SK/VK –SD–
		APPROVED	DM/AG –SD–
ZONE	1. DISCONNECTOR AND EARTH SWITCH INCLUDED IN GT CIRCUIT 2. BAY SEQUENCE CHANGED		

REV.	DATE		
02	04.05.16	ALTERED	
		CHECKED	SK/AA/VK –SD–
		APPROVED	AS/RS –SD–
ZONE	AS PER THDC COMMENT LETTER DATED 16.04.16		

REV.	DATE		
01	22.03.16	ALTERED	
		CHECKED	SK/AA/VK –SD–
		APPROVED	AS/RS –SD–
ZONE	AS PER THDC COMMENT LETTER DATED 15.02.16		

ADDITIONAL INFORMATION
W.O.No. 84008

STATUS OF DRAWING

DISTRIBUTION OF PRINTS

ग्राहक/परियोजना का नाम
NAME OF CUSTOMER/PROJECT

THDC INDIA LTD.
4X111MW VISHNUGAD PIPALKOTI H.E. PROJECT

भारत हेवी इलेक्ट्रिकल्स लिमिटेड
पारेषण व्यापार समूह
BHARAT HEAVY ELECTRICALS LTD.
TRANSMISSION BUSINESS GROUP

	नाम /NAME	हस्ता./SIGN.	दि./DATE
बनाया DRAWN	DM	–SD–	19.01.16
जाँचा CHECKED	SK/AA/VK	–SD–	
स्वीकृत APPROVED	AS/SK	–SD–	

विभाग DEPT. TBEM
कोड CODE 422
अनुपात / SCALE --
कार्ड कोड CARD CODE –

शीर्षक/TITLE
SINGLE LINE DIAGRAM
OF 400KV GIS & POTHEAD

ड्राईग.क./DRAWING NO. TB-3-382-510-001
पुन:/REV. 07

पृष्ठ क./SHEET No. 2 अगला पृष्ठ/NEXT SHEET 3

A3 SIZE

FIRST ANGLE PROJECTION (ALL DIMENSIONS ARE IN MM.)

DRAWING No. TB-3-382-510-001

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COMPUTER DRG. PATH NAME :

REF. DRG. No.

SIGN. & DATE

INVENTORY No.

420kV INDOOR GIS BILL OF QUANTITY (MAIN EQUIPMENT)

S.NOS.	DESCRIPTION	HIGHEST VOLT.	QTY. (NO.)	SYMBOLS
1.	2000A, 3-PH., 40KA FOR 1SEC SF6 CIRCUIT BREAKER SUITABLE FOR 1PH. AND 3PH. OPERATION AUTORECLOSING WITHOUT PRE- INSERTION RESISTOR.	420KV	2	C
2.	2000A, 3-PH., 40KA FOR 1SEC SF6 CIRCUIT BREAKER SUITABLE FOR 3PH. OPERATION OPERATION WITHOUT PRE - INSERTION RESISTOR.	420KV	5	
3.	2000A, 3-PH., 40KA FOR 1SEC DISCONNECTOR SWITCH GROUP OPERATED (220V DC MOTOR) AND MANUALLY OPERATED.	420KV	22	
4.	2000A, 3-PH., 40KA FOR 1SEC SAFETY GROUNDING SWITCH GROUP OPERATED (220V DC MOTOR) AND MANUALLY OPERATED.	420KV	16	
5.	2000A, 3-PH., 40KA FOR 1SEC HIGH SPEED GROUNDING SWITCH INDIVIDUAL POLE OPERATED (220V DC MOTOR).	420KV	8	
6.	2000A, 40KA FOR 1SEC, 1-PH., 4 CORE CT. (400KV GIS LINE FEEDER CT-LINE SIDE)	420KV	6	
7.	2000A, 40KA FOR 1SEC, 1-PH., 3 CORE CT. (400KV GIS LINE FEEDER CT-BUS SIDE)	420KV	6	
8.	500A, 40KA FOR 1SEC, 1-PH., 3 CORE CT. (400KV GIS GT FEEDER CT-BUS SIDE)	420KV	12	
9.	2000A, 40KA FOR 1SEC, 1-PH., 5 CORE CT. (400KV GIS GT FEEDER CT-GT SIDE)	420KV	12	
10.	2000A, 40KA FOR 1SEC, 1-PH., 4 CORE CT. (400KV GIS BUS COUPLER CT-BUS A SIDE)	420KV	3	
11.	2000A, 40KA FOR 1SEC, 1-PH., 3 CORE CT. (400KV GIS BUS COUPLER CT-BUS B SIDE)	420KV	3	
12.	1-PH., 3 CORE VT. (400KV GIS BUS VT)	420KV	6	
13.	1-PH., 20KA SURGE ARRESTOR & CLASS-4, RATED VOLTAGE 390kV	420KV	18	

420kV OUTDOOR POTHEAD BILL OF QUANTITY (MAIN EQUIPMENT)

S.NOS.	DESCRIPTION	HIGHEST VOLT.	QTY. (NO.)	SYMBOLS
20.	2000A, 3-PH., 40KA FOR 1SEC HDB ISOLATOR (ELECTRICALLY GANGED MOTOR OPERATED), WITH 2ES (MECHANICALLY GANGED MOTOR OPERATED)	420KV	2	
21.	2000A, 40KA FOR 1SEC, 1-PH., 5 CORE CT.	420KV	6	
22.	1-PH., 10KA, CLASS-3 SURGE ARRESTOR, RATED VOLTAGE 390KV.	420KV	6	
23.	1-PH., 3 CORE CVT. 4400PF	420KV	6	
24.	2000A, 1mH, 40KA FOR 1SEC, 1-PH. SUSPENSION TYPE WAVE TRAP.	420KV	4	
25.	OUTDOOR CABLE SEALING END (LOCATED IN POTHEAD)	420KV	6+1(SPARE CABLE)	
26.	SF6 INDOOR CABLE SEALING END (LOCATED IN GIS BUILDING)	420KV	6+1(SPARE CABLE)	

NOTE: -

1. SYSTEM FAULT LEVEL 40KA FOR 1 SEC. FOR 400KV.
2. SYSTEM SHALL BE SOLIDLY GROUNDED.
3. 400KV WAVE TRAP SHALL BE PROVIDED IN TWO PH. ONLY.
4. CREEPAGE 25MM/KV.
5. SF6 INDOOR CABLE SEALING END SHALL BE LOCATED INSIDE GIS BUILDING AND SHALL BE DIRECTLY CONNECTED WITH 400KV GIS.
6. OUTDOOR CABLE SEALING END SHALL BE LOCATED IN POTHEAD YARD AND SHALL BE CONNECTED WITH TWIN MOOSE ACSR CONDUCTOR.
7. SINGLE CORE 800SQMM CU/XLPE SPARE CABLE SHALL RUN BETWEEN GIS AND POTHEAD.
8. CT, VT AND CVT PARAMETERS ARE SUBJECT TO FINALIZATION OF ITS SIZING CALCULATIONS. IN CASE OF ANY CHANGES, THIS DOCUMENTS WILL BE UPDATED AND RESUBMITTED.
9. CT, VT AND CVT PARAMETERS ARE SUBJECT TO FINALIZATION OF GIS MANUFACTURER. IN CASE OF ANY CHANGES, THIS DOCUMENTS WILL BE UPDATED AND RESUBMITTED.
10. BAY SEQUENCE DETAILS SHALL BE FINALIZED BY GIS MANUFACTURER.
11. THE FINAL SURGE ARRESTOR CHARACTERISTICS, QUANTITY AND EXACT LOCATIONS ARE SUBJECT TO INSULATION COORDINATION STUDY.

REV.	DATE	ALTERED / CHECKED / APPROVED	ZONE
06	28.07.20	SK / MLK/SKS / AG	AS PER CUSTOMER CORRESPONDENCE
07	19.11.20	SK / MLK/SKS / AG	AS PER CUSTOMER CORRESPONDENCE

REV.	DATE	ALTERED / CHECKED / APPROVED	ZONE
05	03.05.19	SK / MLK/SKS / AG	AS PER CUSTOMER LETTER DATED 01.05.2019
04	08.04.19	SK -SD- / MLK/SKS -SD- / AG -SD-	AS PER CUSTOMER LETTER DATED 29.03.2019
03	28.01.19	SK/VK -SD- / DM/AG -SD-	1. DISCONNECTOR AND EARTH SWITCH INCLUDED IN GT CIRCUIT 2. BAY SEQUENCE CHANGED
02	04.05.16	SK/AA/VK -SD- / AS/RS -SD-	AS PER THDC COMMENT LETTER DATED 16.04.16
01	22.03.16	SK/AA/VK -SD- / AS/RS -SD-	AS PER THDC COMMENT LETTER DATED 15.02.16

ADDITIONAL INFORMATION
W.O.No. 84008

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BHARAT HEAVY ELECTRICALS LTD.
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	नाम /NAME	हस्ता./SIGN.	दि./DATE
बनाया DRAWN	DM	-SD-	19.01.16
जाँचा CHECKED	SK/AA/VK	-SD-	
स्वीकृत APPROVED	AS/SK	-SD-	

विभाग DEPT. TBEM | कोड CODE 422 | अनुपात / SCALE -- | कार्ड कोड CARD CODE -

शीर्षक/TITLE
SINGLE LINE DIAGRAM
OF 400KV GIS & POTHEAD S/S

ड्राईग.क./DRAWING NO. TB-3-382-510-001

पुनः/REV. 07

पृष्ठ क./SHEET No. 3 | अगला पृष्ठ/NEXT SHEET -

A3 SIZE

FIRST ANGLE PROJECTION (ALL DIMENSIONS ARE IN MM.)

DRAWING No. TB-3-382-316-002

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COMPUTER DRG. PATH NAME :

REF. DRG. No.

SIGN. & DATE

INVENTORY No.

1. SCHEDULE OF EQUIPMENT FOR POTHEAD YARD)

ITEM CODE	DESCRIPTION	SYMBOLS	UNITS	QUANTITY
1.	400kV, 2000A, 3-PHASE, 40 kA FOR 1 Sec. HDB ISOLATOR (ELECTRICALLY GANGED MOTOR OPERATED) WITH TWO E/S (MECHANICALLY GANGED MOTOR OPERATED)		Sets	2
2.	400kV, 2000A, 40kA FOR 1 Sec. 1-PHASE, 5 CORE CURRENT TRANSFORMER		Nos.	6
3	400kV, 4400 pF, $\frac{400}{\sqrt{3}} / \frac{0.110}{\sqrt{3}} / \frac{0.110}{\sqrt{3}} / \frac{0.110}{\sqrt{3}}$kV 1-PHASE , 3 CORE CAPACITOR VOLTAGE TRANSFORMER		Nos.	6
4	390kV, 1-PHASE SURGE ARRESTORS, 10KA, CLASS-3		Nos.	6
5	400kV, 2000A, 1mH, 40 KA FOR 1 SEC. 1-PHASE WAVE TRAP (PEDESTAL TYPE)		Nos.	4
6	400kV, 40 KA FOR 1 SEC. 1-PHASE, OUTDOOR CABLE SEALING END		Nos.	7
7	400kV, BUS POST INSULATOR		Nos.	2

2. SYSTEM PARAMETERS

SL.NO.	DESCRIPTION	UNIT	AT EL:1000	AT EL:1101.10
1.	NOMINAL SYSTEM VOLTAGE	kV	400	400
2.	HIGHEST SYSTEM VOLTAGE	kV	As per IS/IEC	
3.	BASIC IMPULSE LEVEL	kVP	1425	1443
4.	POWER FREQUENCY WITHSTAND	kVrms	630	638
5.	SWITCHING IMPULSE WITHSTAND VOLTAGE	kVpeak	1050	1060
6.	CREEPAGE DISTANCE (MINIMUM)	mm/kV	25	25
7.	SYSTEM FAULT LEVEL (FOR 1 SEC)	kA	40	40

RECOMMENDED
संस्तुत
शैलेन्द्र सिंह पंवार
Shailendra Singh Panwar
उपमहाप्रबंधक (विद्युत यांत्रिक-परिकल्प)
Dy. General Manager (EM-Design)
टीएचडीसी इंडिया लिमिटेड, ऋषिकेश
THDC INDIA LTD., RISHIKESH

4. MINIMUM CLEARANCE TABLE (IN AIR)

SL.NO.	DESCRIPTION	UNIT	AT EL:1000	AT EL:1101.10
1.	PHASE TO PHASE	mm	4200	4254
2.	PHASE TO EARTH	mm	3500	3545
3.	MINIMUM DISTANCE OF THE LOWEST EARTH PART OF INSULATOR SUPPORTING LIVE CONDUCTORS FROM TOP OF PLINTH LEVEL	mm	2550	2550
4.	SECTION CLEARANCE	mm	6500	6583
5.	HEIGHT OF COND. CENTER LINE OF FIRST LEVEL FROM FFL OF PLATFORM	mm	8300	8300

APPROVED
अनुमोदित
16/9/2022.
नीरज वर्मा / Neeraj Verma
महाप्रबन्धक (विद्युत परिकल्प)
General Manager (EM-Design)
टीएचडीसी इंडिया लिमिटेड, ऋषिकेश
THDC India Limited, Rishikesh

4. EQUIPMENT CONNECTION SCHEDULE

SL.NO.	DESCRIPTION	DESCRIPTION
1.	EQUIPMENT INTERCONNECTION	TWIN MOOSE ACSR
2.	JUMPER/ DROPPERS	TWIN MOOSE ACSR
3.	EARTH WIRE	7/3.66 (7/9 SWG) GS (10.98mm DIA)

Approval of this drawing/document does not absolve contractor of its responsibility for manufacturing of the equipment as per ER & GTP for the achievement of designed performance at site and completeness of the equipment.

जाँची गई/CHECKED

अनिल रघुवंशी / Anil Raghuvanshi
वरि. प्रबन्धक (विद्युत परिकल्प)
Sr. Manager (EM-Design)
टीएचडीसी इंडिया लिमिटेड, ऋषिकेश
THDC India Limited, Rishikesh

16.09.22

NOTES:-

1. ALL DIMENSIONS ARE IN MM UNLESS OTHERWISE SPECIFIED.
2. INSULATOR DATA
   A. 400KV SINGLE SUSPENSION STRING (SINGLE ANCHORING POINT) = 23 NOS. ANTI FOG TYPE DISC.
   B. ELECTRO-MECHANICAL FAILING LOAD PER DISC = 160 kN
   C. CREEPAGE DISTANCE OF INDIVIDUAL DISC = 470MM
3. ALL POTHEAD YARD EQUIPMENTS ARE PROTECTED FROM 7/3.66 GALVANISED STEEL WIRE.
4. SUPPLY AND STRINGING OF 400kV OUTGOING LINE CONDUCTOR, SHIELD WIRE, INSULATOR AND HARDWARE BETWEEN DEAD END TOWER AND POTHEAD YAED TERMINAL GANTRY ARE NOT IN BHEL SCOPE. HOWEVER, JUMPERING FOR THE RESPECTIVE EQUIPMENT SHIELDING REQUIREMENT FOR PROTECTION OF LIVE EQUIPMENT, JUMPERS & HARDWARE REQUIRED FOR JUMPERS ARE IN SCOPE OF BHEL.
5. ALL SWITCHYARD EQUIPMENTS & TOWER STRUCTURE SHALL BE LATTICE TYPE.
6. SEPARATE DRAWING SHALL BE REFERRED FOR ERECTION KEY DIAGRAM, TRENCH LAYOUT FOR LT & 400kV CABLE, EARTHMAT LAYOUT, TOWER/ BEAM, ILLUMINATION SYSTEM, FENCE & GATE ETC.
7. STATIC TENSION ON THE BUSES AND SHIELD WIRE SHALL BE SHOWN IN THE STRUCTURE LOADING DIAGRAM TO BE SUBMITTED SEPARATELY.
8. LOCATION OF DEAD END TRANSMISSION LINE TOWER OF OUTGOING LINE SHALL BE FINALISED BY CUSTOMER & INFORMED TO BHEL .
9. WAVE TRAP SHALL BE PROVIDED IN TWO PHASES AS PER PLCC REQUIREMENTS.
10. SURGE ARRESTOR PRESSURE RELIEF VALVE SHALL NOT BE TOWARDS ANY EQUIPMENT.
11. COMPLETE GROUNDING WORK LIKE INSTALLATION AND SUPPLY SHALL BE IN BHEL SCOPE.
12. CIVIL WORK OF POTHEADYARD, GIS AND CABLE TUNNEL SHALL BE IN CUSTOMER SCOPE, HOWEVER, ONLY DESIGN OF POTHEADYARD SHALL BE IN BHEL SCOPE.
13. ILLUMINATION OF POTHEADYARD SHALL BE IN BHEL PEM NOIDA SCOPE.
14. DG SET AND SWITCHGEAR SHALL BE IN BHEL BHOPAL SCOPE.
15. AIR CONDITIONING & VENTILATION SYSTEM SHALL BE IN BHEL PSNR NOIDA SCOPE.
16. FIRE FIGHTING SHALL BE IN PE&SD BHEL HYDRABAD SCOPE.
17. 400KV XLPE CABLE SHALL BE IN BHEL TBG NOIDA SCOPE.
18. 400KV SPARE CABLE AT POTHEAD YARD END SHALL BE PERMANENTLY CONNECTED WITH OUTDOOR CABLE SEALING END.

JUMPERING ARRANGEMENT AT 400KV CABLE SEALING END AND 400KV CT IN POTHEAD YARD

1. THE OVER HEAD ELECTRCIAL CONNECTION BETWEEN THE CSE(CABLE SEALING END) AND 400KV CTs SHALL BE AS SHOWN BY SOLID LINES. ———
2. HOWEVER IN CASE OF THE 400KV CABLE FAILURE THE HEALTHY CABLE SHALL BE CONNECTED IN SWYD AS SHOWN BY DOTTED LINE. — — —
3. ACCORDINGLY THE CABLE ADAPTER AT THE GIS END SHALL BE SWAPPED TO MAINTAIN THE PHASE SEQUENCE

REFERENCE

REV.	DATE				ZONE
09	16.09.22	ALTERED	SY	-SD-	AS PER CUSTOMER COMMENTS DATED 05.08.22
		CHECKED	DKS	-SD-	
		APPROVED	VK	-SD-	
08	20.07.22	ALTERED	SY	-SD-	DUE TO CHANGE IN THE LOCATION OF THE SWITCHYARD AS PER CUSTOMER EMAIL DATED xxxxx
		CHECKED	DKS	-SD-	
		APPROVED	VK	-SD-	
07		ALTERED	VYOM	-SD-	DUE TO CHANGE IN THE LOCATION OF THE SWITCHYARD AS PER CUSTOMER EMAIL DATED 12.04.2022
		CHECKED	JAI KUMAR	-SD-	
		APPROVED	VK	-SD-	
06		ALTERED	VYOM	-SD-	DUE TO CHANGE IN THE LOCATION OF THE SWITCHYARD AS PER CUSTOMER EMAIL DATED xxxxx.04.2022
		CHECKED	JAI KUMAR	-SD-	
		APPROVED	VK	-SD-	
04	06.06.19	ALTERED	PK		THE LAYOUT IS REVISED TO INCLUDE THE DETAILS FOR THE SPARE 400KV XLPE THDC/RKSH/EMD/VPHEP/401-6/2855
		CHECKED	SK/SKS		
		APPROVED	AG		
03	01.01.19	ALTERED	PK	-SD-	AS PER MOM DATED 20.05.19
		CHECKED	SK/DM	-SD-	
		APPROVED	AG	-SD-	
02	09.11.17	ALTERED	DM	-SD-	AS PER CUSTOMER CUMMENT DATED 05.12.17
		CHECKED	SK	-SD-	
		APPROVED	RS/DM	-SD-	
01	19.01.17	ALTERED	DM	-SD-	AS PER CUSTOMER E-MAIL DATED 03.11.17
		CHECKED	SK	-SD-	
		APPROVED	RS/AS	-SD-	

ADDITIONAL INFORMATION
W.O.No.
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बनाया DRAWN	PK	-SD-	07.10.16
जाँचा CHECKED	SK	-SD-	
स्वीकृत APPROVED	AS	-SD-	

विभाग DEPT. TBEM
कोड CODE 422
अनुपात / SCALE
कार्ड कोड CARD CODE

शीर्षक/TITLE
LAYOUT PLAN & ELEVATION OF 400KV POTHEAD YARD

ड्राईंग क्र./DRAWING NO. TB-3-382-316-002
पुनः/REV. 09
पृष्ठ क्र./SHEET No. 01
अगला पृष्ठ /NEXT SHEET 02

FIRST ANGLE PROJECTION (ALL DIMENSIONS ARE IN MM.)

DRAWING No. TB-3-382-316-002

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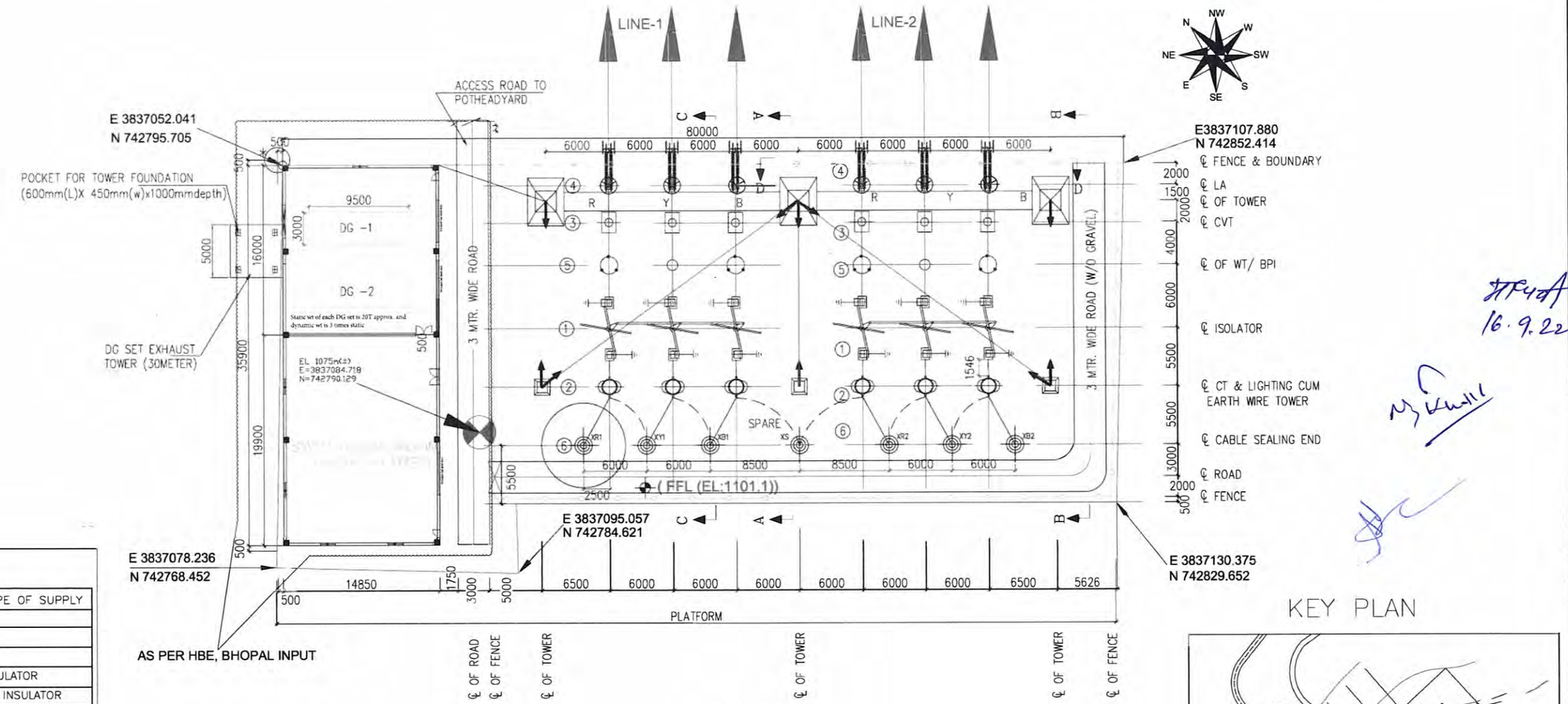
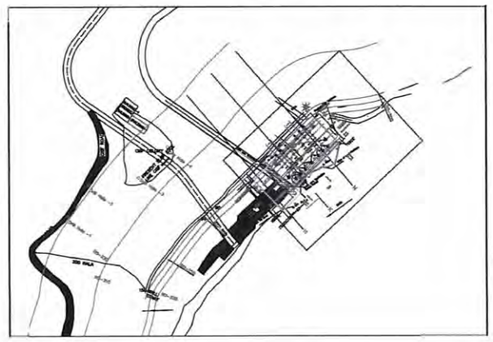
COMPUTER DRG. PATH NAME :
REF. DRG. No.
SIGN. & DATE
INVENTORY No.



PLAN

KEY PLAN



LEGEND TABLE

———	PRESENT BHEL SCOPE OF SUPPLY
———	CUSTOMER SCOPE
←———	SHIELD WIRE
—o—o—	FENCE
	TENSION STRING INSULATOR
○	SUSPENSION STRING INSULATOR
	LIGHTING CUM EARTH WIRE TOWER
	TOWER WITH PEAK
———	CONDUCTOR
	GATE
	PLATFORM AREA
FFL	FINISHED FLOOR LEVEL OF PLATFORM

Ref. Drawings:

1. Key Plan– 5061149–C1001_[7]
   VPHEP Pothead yard Location
2. For Input details for DG set room Please refer BHEL,Bhopal mail Dtd.22.07.2022

REV.	DATE			ZONE
09	16.09.22	ALTERED	SY –SD–	AS PER CUSTOMER COMMENTS DATED 05.08.22
		CHECKED	DKS –SD–	
		APPROVED	VK –SD–	
08	20.07.22	ALTERED	SY –SD–	DUE TO CHANGE IN THE LOCATION OF THE SWITCHYARD AS PER CUSTOMER EMAIL DATED 27.06.2022
		CHECKED	DKS –SD–	
		APPROVED	VK –SD–	
07		ALTERED	VYOM –SD–	DUE TO CHANGE IN THE LOCATION OF THE SWITCHYARD AS PER CUSTOMER EMAIL DATED 12.04.2022
		CHECKED	JAI KUMAR –SD–	
		APPROVED	VK –SD–	
06		ALTERED	VYOM –SD–	DUE TO CHANGE IN THE LOCATION OF THE SWITCHYARD AS PER CUSTOMER COMMENTS
		CHECKED	JAI KUMAR –SD–	
		APPROVED	VK –SD–	
05	06.11.19	ALTERED	PK	THE LAYOUT IS REVISED TO INCLUDE THE DETAILS FOR THE SPARE 400KV XLPE CABLE UTILISATION . COMMENTS VIED LETTER No. THDC/RKSH/EMD/VPHEP/401–6/2855 DATED – 23/07/2019.
		CHECKED	SK/SKS	
		APPROVED	AG	
04	06.06.19	ALTERED	PK	AS PER MOM DATED 20.05.19
		CHECKED	SK/SKS	
		APPROVED	AG	
03	01.01.19	ALTERED	PK –SD–	AS PER CUSTOMER CUMMENT DATED 05.12.17
		CHECKED	SK/DM –SD–	
		APPROVED	AG –SD–	
02	09.11.17	ALTERED	DM –SD–	AS PER CUSTOMER E–MAIL DATED 03.11.17
		CHECKED	SK –SD–	
		APPROVED	RS/DM –SD–	
01	19.01.17	ALTERED	DM –SD–	AS PER CUSTOMER LETTER DATED 07.11.16
		CHECKED	SK –SD–	
		APPROVED	RS/AS –SD–	

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विभाग DEPT. TBEM | कोड CODE 422 | अनुपात / SCALE | कार्ड कोड CARD CODE

शीर्षक/TITLE
LAYOUT PLAN & ELEVATION OF 400KV POTHEAD YARD

डाईग.क./DRAWING NO. TB-3-382-316-002

पृष्ठ क./SHEET No. 02 | अगला पृष्ठ/NEXT SHEET 03

पुन:/REV. 09

A3 SIZE

FIRST ANGLE PROJECTION (ALL DIMENSIONS ARE IN MM.)

DRAWING No. TB-3-382-316-002

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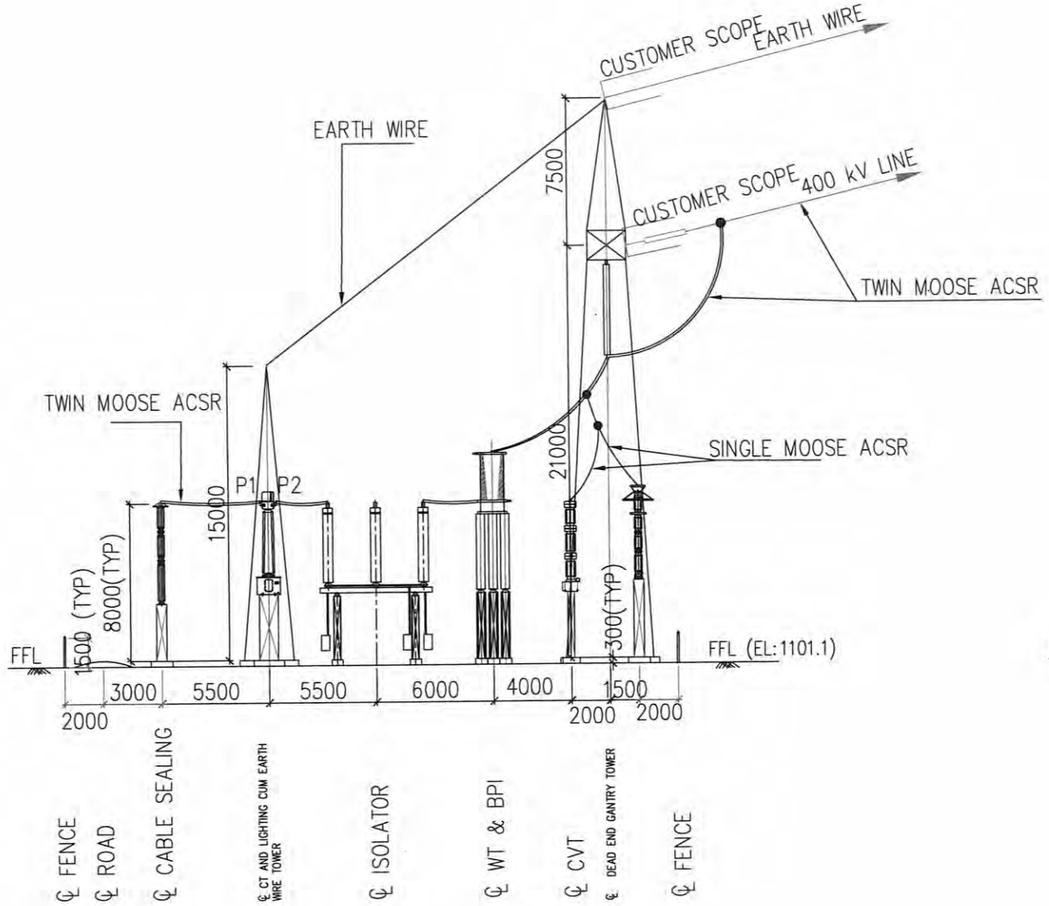
COMPUTER DRG. PATH NAME :

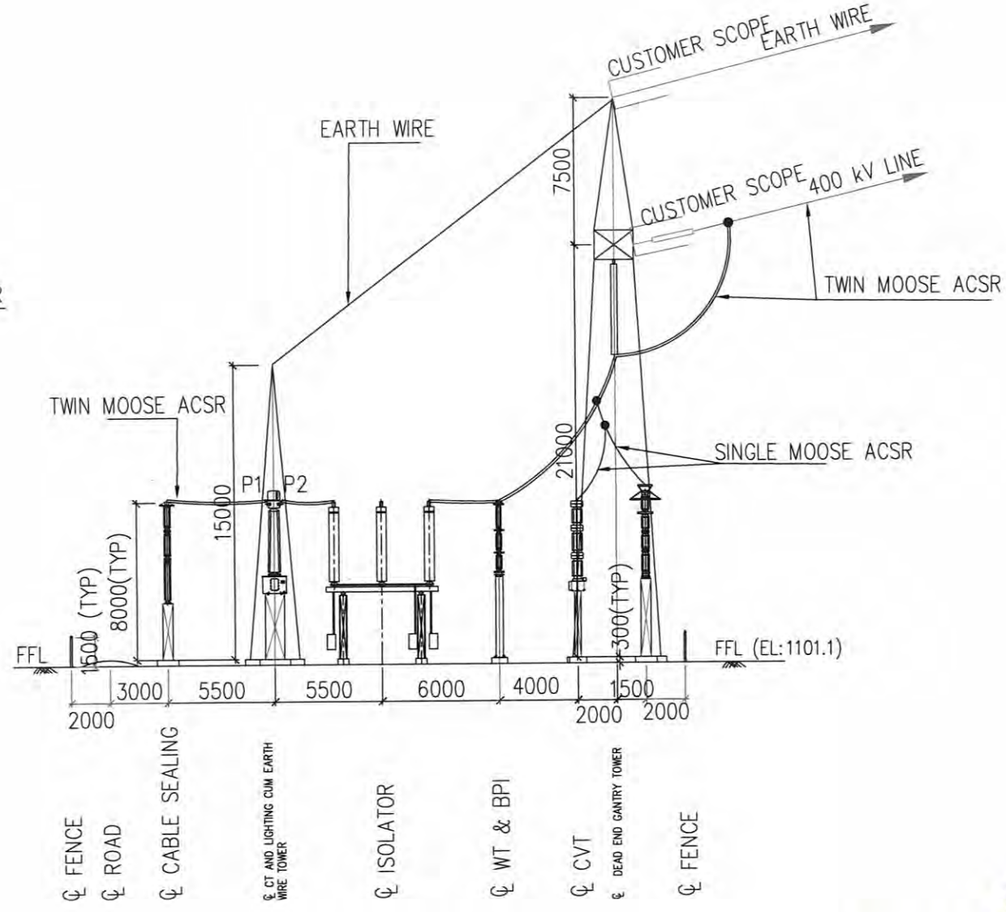
REF. DRG. No.

SIGN. & DATE

INVENTORY No.



SECTION ''A-A'' & ''B-B''



SECTION ''C-C''

16.09.22

REV.	DATE			
09	16.09.22	ALTERED	SY	–SD–
		CHECKED	DKS	–SD–
		APPROVED	VK	–SD–
ZONE	AS PER CUSTOMER COMMENTS DATED 05.08.22			
REV.	DATE			
		ALTERED		
		CHECKED	SK/SKS	
		APPROVED		
ZONE	THE LAYOUT IS REVISED TO INCLUDE THE DETAILS FOR THE SPARE 400KV XLPE THDC/RKSH/EMD/VPHEP/401-6/2855			

REV.	DATE			
08	20.07.22	ALTERED	SY	–SD–
		CHECKED	DKS	–SD–
		APPROVED	VK	–SD–
ZONE	DUE TO CHANGE IN THE LOCATION OF THE SWITCHYARD AS PER CUSTOMER EMAIL DATED 27.06.2022			
REV.	DATE			
04	06.06.19	ALTERED	PK	
		CHECKED	SK/SKS	
		APPROVED	AG	
ZONE	AS PER MOM DATED 20.05.19			

REV.	DATE			
07		ALTERED	VYOM	–SD–
		CHECKED	JAI KUMAR	–SD–
		APPROVED	VK	–SD–
ZONE	DUE TO CHANGE IN THE LOCATION OF THE SWITCHYARD AS PER CUSTOMER EMAIL DATED 12.04.2022			
REV.	DATE			
03	01.01.19	ALTERED	PK	–SD–
		CHECKED	SK/DM	–SD–
		APPROVED	AG	–SD–
ZONE	AS PER CUSTOMER CUMMENT DATED 05.12.17			

REV.	DATE			
06		ALTERED	VYOM	–SD–
		CHECKED	JAI KUMAR	–SD–
		APPROVED	VK	–SD–
ZONE	DUE TO CHANGE IN THE LOCATION OF THE SWITCHYARD AS PER CUSTOMER COMMENTS			
REV.	DATE			
02	09.11.17	ALTERED	DM	–SD–
		CHECKED	SK	–SD–
		APPROVED	RS/DM	–SD–
ZONE	AS PER CUSTOMER E-MAIL DATED 03.11.17			

REV.	DATE			
01	19.01.17	ALTERED	DM	–SD–
		CHECKED	SK	–SD–
		APPROVED	RS/AS	–SD–
ZONE	AS PER CUSTOMER LETTER DATED 07.11.16			

ADDITIONAL INFORMATION
W.O.No.

STATUS OF DRAWING
DISTRIBUTION OF PRINTS

ग्राहक/परियोजना का नाम
NAME OF CUSTOMER/PROJECT

THDC INDIA LTD.
4X111MW VISHNUGAD PIPALKOTI H.E. PROJECT

BHEL
भारत हेवी इलेक्ट्रिकल्स लिमिटेड
पारेषण व्यापार समूह
BHARAT HEAVY ELECTRICALS LTD.
TRANSMISSION BUSINESS GROUP

	नाम /NAME	हस्ता ./SIGN.	दि./DATE
बनाया DRAWN	PK	–SD–	07.10.16
जाँचा CHECKED	SK	–SD–	
स्वीकृत APPROVED	AS	–SD–	

विभाग DEPT. TBEM
कोड CODE 422
अनुपात / SCALE
कार्ड कोड CARD CODE

शीर्षक/TITLE
LAYOUT PLAN & ELEVATION OF 400KV POTHEAD YARD

ड्राईग. क./DRAWING NO.
TB-3-382-316-002

पुनः/REV. 09

पृष्ठ क./SHEET No. 03 | अगला पृष्ठ /NEXT SHEET 04

A3 SIZE

FIRST ANGLE PROJECTION (ALL DIMENSIONS ARE IN MM.)

DRAWING No. TB-3-382-316-002

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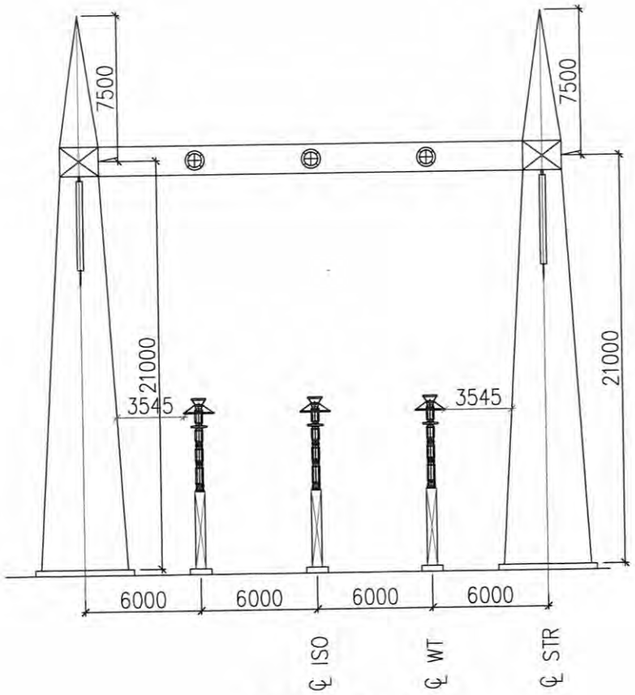
COMPUTER DRG. PATH NAME :

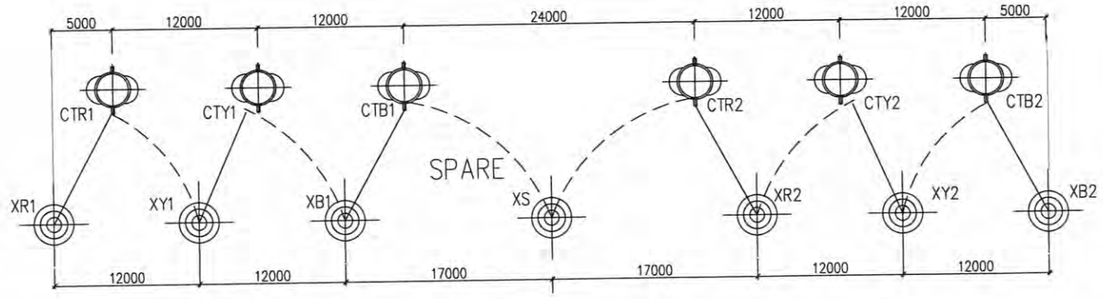
REF. DRG. No.

SIGN. & DATE

INVENTORY No.



SECTION "D-D"



JUMPER SEQUENCE

S. NOS.	DESCRIPTION	CONNECTION DETAILS IN POTHEAD YARD
1.	NORMAL CONDITION INTERCONNECTION	XR1–CTR1 , XY1–CTY1 , XB1–CTB1 , XR2–CTR2 , XY2–CTY2 , XB2–CTB2
2.	R1 CABLE FAILURE INTERCONNECTION	XY1–CTR1 , XB1–CTY1 , XS–CTB1 , XR2–CTR2 , XY2–CTY2 , XB2–CTB2
3.	Y1 CABLE FAILURE INTERCONNECTION	XR1–CTR1 , XB1–CTY1 , XS–CTB1 , XR2–CTR2 , XY2–CTY2 , XB2–CTB2
4.	B1 CABLE FAILURE INTERCONNECTION	XR1–CTR1 , XY1–CTY1 , XS–CTB1 , XR2–CTR2 , XY2–CTY2 , XB2–CTB2
5.	R2 CABLE FAILURE INTERCONNECTION	XR1–CTR1 , XY1–CTY1 , XB1–CTB1 , XS–CTR2 , XY2–CTY2 , XB2–CTB2
6.	Y2 CABLE FAILURE INTERCONNECTION	XS–CTR1 , XY1–CTY1 , XB1–CTB1 , XS–CTR2 , XR2–CTY2 , XB2–CTB2
7.	B2 CABLE FAILURE INTERCONNECTION	XR1–CTR1 , XY1–CTY1 , XB1–CTB1 , XS–CTR2 , XR2–CTY2 , XY2–CTB2

NOTES:–

1. THE 400KV XLPE TERMINATION ON THE GIS SHALL ALSO BE SWAPPED TO RETAIN THE PHASE SEQUENCE OF THE 400KV SYSTEM .

16.09.22

REV.	DATE			REV.	DATE			REV.	DATE			REV.	DATE			REV.	DATE		
09	16.09.22	ALTERED	SY –SD–	08	20.07.22	ALTERED	SY –SD–	07		ALTERED	VYOM –SD–	06		ALTERED	VYOM –SD–			ALTERED	
		CHECKED	DKS –SD–			CHECKED	DKS –SD–			CHECKED	JAI KUMAR –SD–			CHECKED	JAI KUMAR –SD–			CHECKED	SK/SKS
		APPROVED	VK –SD–			APPROVED	VK –SD–			APPROVED	VK –SD–			APPROVED	VK –SD–			APPROVED	
ZONE	AS PER CUSTOMER COMMENTS DATED 05.08.22			ZONE	DUE TO CHANGE IN THE LOCATION OF THE SWITCHYARD AS PER CUSTOMER EMAIL DATED 27.06.2022			ZONE	DUE TO CHANGE IN THE LOCATION OF THE SWITCHYARD AS PER CUSTOMER EMAIL DATED 12.04.2022			ZONE	DUE TO CHANGE IN THE LOCATION OF THE SWITCHYARD AS PER CUSTOMER COMMENTS			ZONE			
REV.	DATE			REV.	DATE			REV.	DATE			REV.	DATE			REV.	DATE		
		ALTERED		04	06.06.19	ALTERED	PK	03	01.01.19	ALTERED	PK –SD–	02	09.11.17	ALTERED	DM –SD–	01	19.01.17	ALTERED	DM –SD–
		CHECKED	SK/SKS			CHECKED	SK/SKS			CHECKED	SK/DM –SD–			CHECKED	SK –SD–			CHECKED	SK –SD–
		APPROVED				APPROVED	AG			APPROVED	AG –SD–			APPROVED	RS/DM –SD–			APPROVED	RS/AS –SD–
ZONE	THE LAYOUT IS REVISED TO INCLUDE THE DETAILS FOR THE SPARE 400KV XLPE THDC/RKSH/EMD/VPHEP/401–6/2855			ZONE	AS PER MOM DATED 20.05.19			ZONE	AS PER CUSTOMER CUMMENT DATED 05.12.17			ZONE	AS PER CUSTOMER E–MAIL DATED 03.11.17			ZONE	AS PER CUSTOMER LETTER DATED 07.11.16		

ADDITIONAL INFORMATION
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NAME OF CUSTOMER/PROJECT
THDC INDIA LTD.
4X111MW VISHNUGAD PIPALKOTI H.E. PROJECT

BHEL भारत हेवी इलेक्ट्रिकल्स लिमिटेड
भारी उद्योग मन्त्रालय समूह
BHARAT HEAVY ELECTRICALS LTD.
TRANSMISSION BUSINESS GROUP

	नाम /NAME	हस्ता./SIGN.	दि./DATE
बनाया DRAWN	PK	–SD–	07.10.16
जँचा CHECKED	SK	–SD–	
स्वीकृत APPROVED	AS	–SD–	

विभाग DEPT. TBEM
कोड CODE 422
अनुपात / SCALE
कार्ड कोड CARD CODE

शीर्षक/TITLE
LAYOUT PLAN & ELEVATION OF 400KV POTHEAD YARD

ड्राईंग क्र./DRAWING NO. TB-3-382-316-002
पुनः/REV. 09
पृष्ठ क्र./SHEET No. 04
अगला पृष्ठ/NEXT SHEET 05

A3 SIZE

FIRST ANGLE PROJECTION (ALL DIMENSIONS ARE IN MM.)

DRAWING No. TB-3-382-316-002

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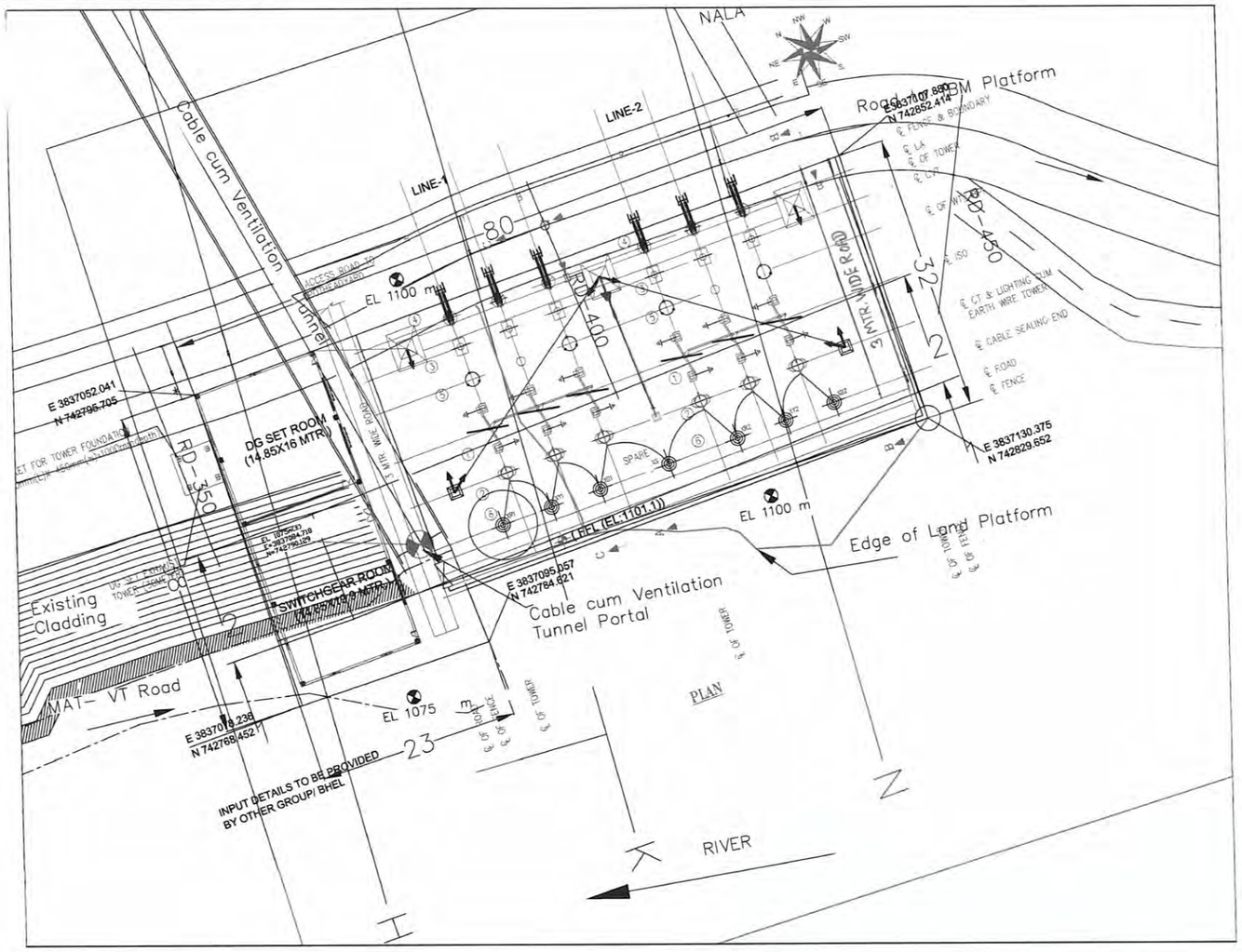
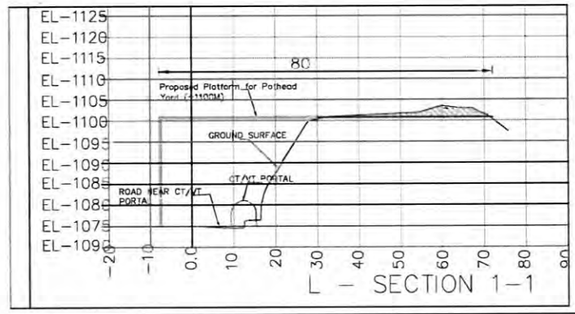
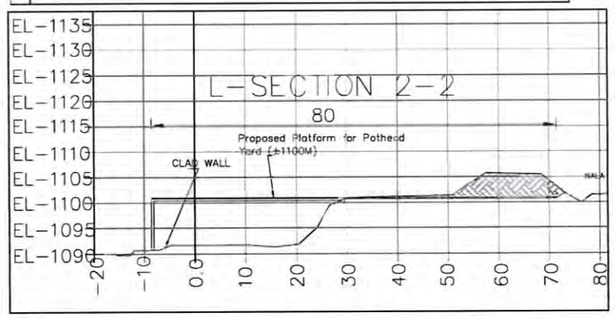
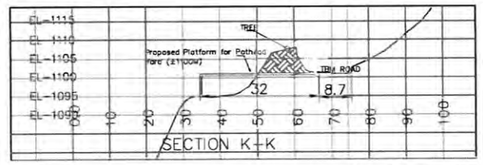
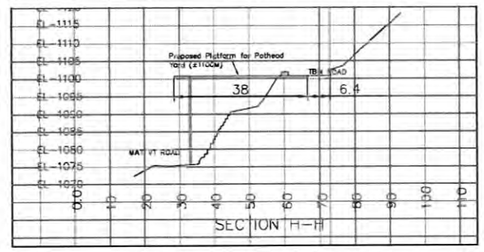
SIGN. & DATE
INVENTORY No.

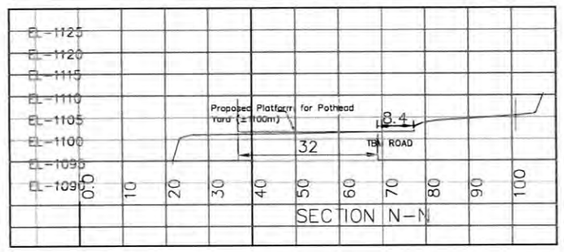












16.09.22

REV.	DATE				DESCRIPTION
09	16.09.22	ALTERED / CHECKED / APPROVED	SY / DKS / VK	-SD-	AS PER CUSTOMER COMMENTS DATED 05.08.22
08	20.07.22	ALTERED / CHECKED / APPROVED	SY / DKS / VK	-SD-	DUE TO CHANGE IN THE LOCATION OF THE SWITCHYARD AS PER CUSTOMER EMAIL DATED 27.06.2022
07		ALTERED / CHECKED / APPROVED	VYOM / JAI KUMAR / VK	-SD-	DUE TO CHANGE IN THE LOCATION OF THE SWITCHYARD AS PER CUSTOMER EMAIL DATED 12.04.2022
06		ALTERED / CHECKED / APPROVED	VYOM / JAI KUMAR / VK	-SD-	DUE TO CHANGE IN THE LOCATION OF THE SWITCHYARD AS PER CUSTOMER COMMENTS
05	06.11.19	ALTERED / CHECKED / APPROVED	PK / SK/SKS / AG	-SD-	THE LAYOUT IS REVISED TO INCLUDE THE DETAILS FOR THE SPARE 400KV XLPE CABLE UTILISATION. COMMENTS VIED LETTER No. THDC/RKSH/EMD/VPHEP/401-6/2855 DATED - 23/07/2019.
04	06.06.19	ALTERED / CHECKED / APPROVED	PK / SK/SKS / AG	-SD-	AS PER MOM DATED 20.05.19
03	01.01.19	ALTERED / CHECKED / APPROVED	PK / SK/DM / AG	-SD-	AS PER CUSTOMER CUMMENT DATED 05.12.17
02	09.11.17	ALTERED / CHECKED / APPROVED	DM / SK / RS/DM	-SD-	AS PER CUSTOMER E-MAIL DATED 03.11.17
01	19.01.17	ALTERED / CHECKED / APPROVED	DM / SK / RS/AS	-SD-	AS PER CUSTOMER LETTER DATED 07.11.16

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पारेषण व्यापार समूह
BHARAT HEAVY ELECTRICALS LTD.
TRANSMISSION BUSINESS GROUP

	NAME	SIGN.	DATE
बनाया DRAWN	PK	-SD-	07.10.16
जाँचा CHECKED	SK	-SD-	
स्वीकृत APPROVED	AS	-SD-	

विभाग DEPT. TBEM
कोड CODE 422
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शीर्षक/TITLE
LAYOUT PLAN & ELEVATION OF 400KV POTHEAD YARD

ड्राईंग क्र./DRAWING NO. TB-3-382-316-002
पुनः/REV. 09
पृष्ठ क्र./SHEET No. 05
अगला पृष्ठ/NEXT SHEET

A3 SIZE

FIRST ANGLE PROJECTION (ALL DIMENSIONS ARE IN MM.)

DRAWING No. TB-0-382-316-014

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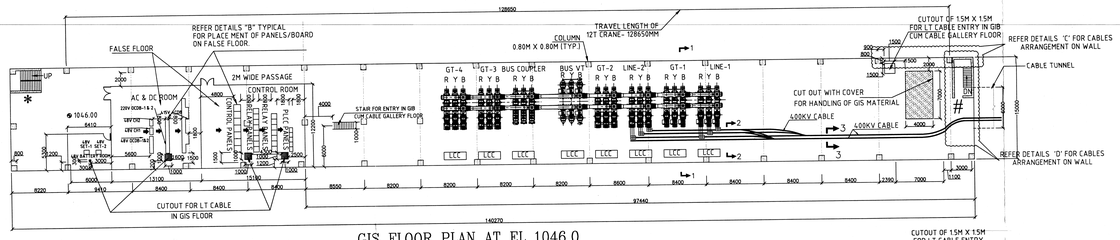
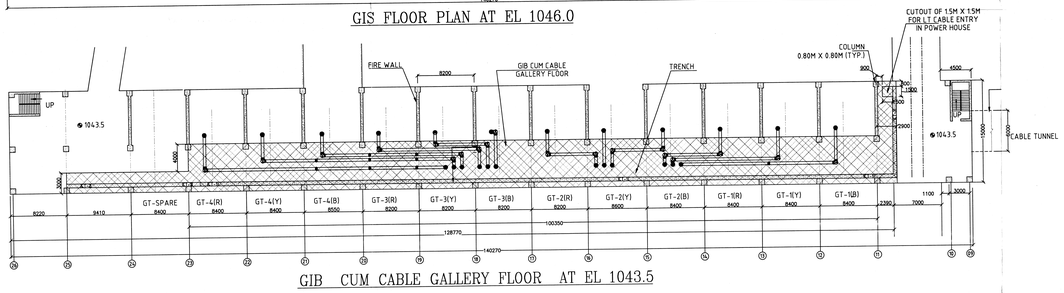
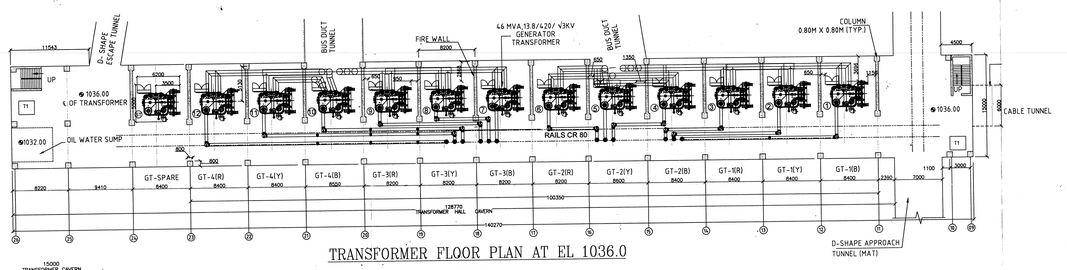
COMPUTER DRG. PATH NAME :



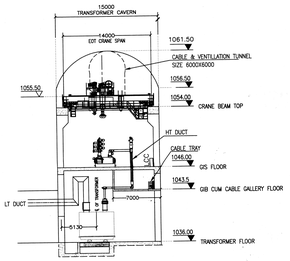
GIS FLOOR PLAN AT EL 1046.0



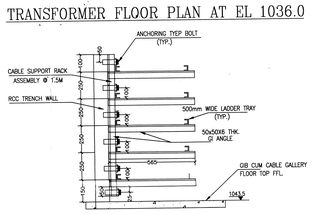
GIB CUM CABLE GALLERY FLOOR AT EL 1043.5



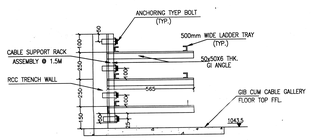
TRANSFORMER FLOOR PLAN AT EL 1036.0



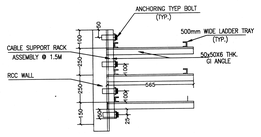
SECTION 1-1



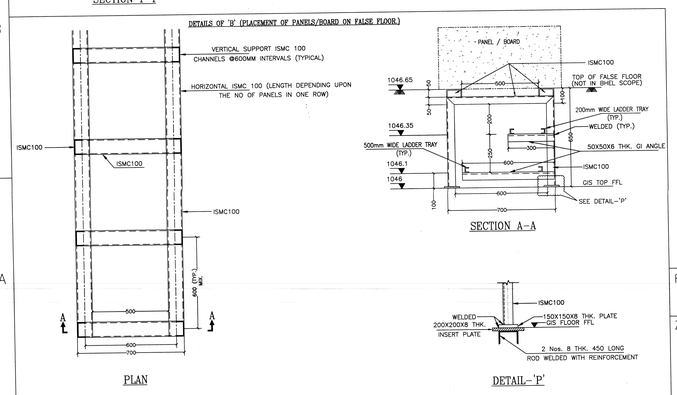
CABLE TRAY (CT) - 1



CABLE TRAY (CT) - 2



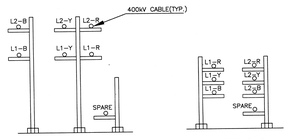
CABLE TRAY (CT) - 3



PLAN

SECTION A-A

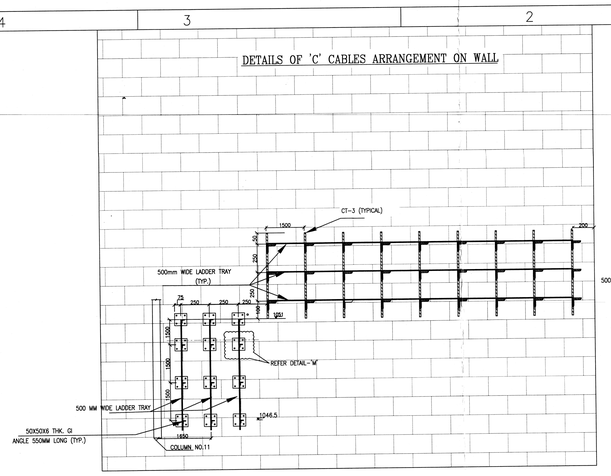
DETAIL-'P'



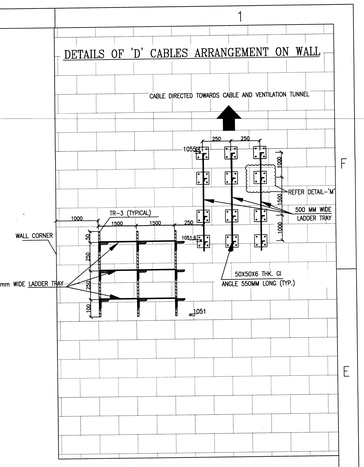
SECTION 2-2

SECTION 3-3

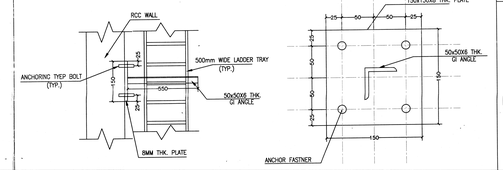
DETAILS OF 'C' CABLES ARRANGEMENT ON WALL



DETAILS OF 'D' CABLES ARRANGEMENT ON WALL



DETAIL 'M'



LEGEND.

- ➡ - FRONT SIDE OF PANEL
- ✱ STAIR CASE AT EXTREME END OF TRANSOFRMER HALL SHOULD BE EXTENDED TILLL EL 1055.50 FOR ACCESS OF EOT PLATFORM.
- # STAIRCASE AT EXTREME END OF THE GIS FLOOR TOWARDS CABLE VENTILATION TUNNEL(CVT) IS TO BE EXTENDED AT GIS FLOOR AND A HELICAL STAIRCASE FROM GIS HALL TO EL1055.50 SHALL BE PROVIDED FOR EOT OPERATION AND MAINTENANCE.
- LCC LOCAL CONTROL CUBICLE
- FFL FINISH FLOOR LEVEL
- GIB CUM CABLE GALLERY FLOOR
- CABLE TRAY (5 TIER)
- CABLE TRAY (3 TIER)

NOTES.

1. ALL DIMENSION ARE IN MM.
2. DIMENSION AND ARRANGEMENT OF PANELS AND GIS INSIDE THE ROOM ARE INDICATIVE ONLY SHALL BE FINALIZED DURING DETAILED ENGINEERING.
3. ALL THE DIMENSION OF THE ROOM ARE FROM CENTER LINE OF WALL(THICKNESS OF WALL IS 230MM).
4. BENDING RADIUS OF 400 KV CABLE IS 20D (D IS OVERALL DIAMETER OF CABLE). BENDING RADIUS OF LT CABLE IS 15D (D IS OVERALL DIAMETER OF CABLE).
5. TWO NOS. 220V DCDB INCOMER FEEDER SUPPLY SHALL BE PROVIDED BY BHEL HSE BHOPAL FOR POTHEAD AND GIS APPLICATION.
6. TWO NOS. 415V AC INCOMER FEEDER SUPPLY SHALL BE PROVIDED BY BHEL HSE BHOPAL FOR POTHEAD AND GIS APPLICATION.
7. GIS BAY LOCATION ARE TENTATIVE AND SAME SHALL BE FINALIZED DURING DETAILED ENGINEERING BY GIS SUPPLIER.
8. THE HIEGHT OF THE WALL OF THE ROOMS LOCATED IN GIS HALL SHALL BE 4.5 METERS ABOVE GIS FFL AND ALL ROOMS SHALLBE OPEN AT TOP.
9. GIB CUM CABLE GALLERY FLOOR SHALL BE CLOSED.
10. FALSE FLOOR SHALL BE PROVIDED IN CONTROL ROOM AND AC & DC ROOM FOR PANEL/BOARD PLACEMENT. FALSE FLOOR SHALL BE IN CUSTOMER SCOPE.
11. SEPARATE DRAWING. (i.e. FOR POTHEAD AND GIS) SHALL BE SUBMITTED FOR FOLLOWING FACILITY.
    A. ILLUMINATION- BHEL PEM NOIDA
    B. EOT CRANE- BHEL PSNR NOIDA
    C. AIR CONDITIONING & VENTILATION SYSTEM- BHEL PSNR NOIDA
    D. FIRE FIGHTING- PE & SD BHEL HYDRABAD.
    E. 400KV XLPE CABLE- BHEL TBG NOIDA
12. EXACT LOCATIONS AND SIZES OF CUT-OUTS IN FLOORS WILL BE INDICATED IN DETAILED DRAWING.
13. CABLE COVER SHALL BE PROVIDED FOR EXPOSED CABLE LAID BETWEEN GIS FLOOR TO MAT.
14. SUPPLY AND INSTALLATION OF EMBEDMENT OF CABLE SUPPORT STRUCTURES SHALL BE IN BHEL SCOPE.
15. CABLE ROUTING (POWER CABLE, CONTROL CABLES AND COMMUNICATION CABLE) FROM GIS TO CONTROL ROOM/CABLE CONNECTING GALLERY THROUGH MAT AND FROM GIS TO POTHEAD YARD THROUGH CVT SHALL BE SUBMITTED IN A SEPARATE DRAWING.

REFERENCE DWG.

1. POWER HOUSE COMPLEX GENERAL ARRANGEMENT OPERATING FLOOR - 71.2754.08.010
2. SINGLE LINE DIAGRAM FOR 400KV GIS & POTHEAD - TB-3-382-510-001

संस्तुत RECOMMENDED 15.11.19
आर. के. सेमवाल I.R.K. SEMWAL Chief Manager (Engg.) (Addl. General Manager (Ex.Cadre)) THDC INDIA LTD. ROORKEE

अनुमोदित APPROVED 16.11.19
Approval of this drawing/document does not absolve contractor of its responsibility for manufacturing of the equipment as per GR & GTP for the achievement of designed performance at site and completeness of the equipment.

REV.	DATE			
03	31.08.18	ALTERED	SY	
		CHECKED	SK	
		APPROVED	DM/AC	
ZONE	DRAWING REVISED AS PER CUSTOMER EMAIL DATED 19.07.18			
02	28.06.18	ALTERED	SY	-SD-
		CHECKED	SK	-SD-
		APPROVED	DM/RS	-SD-
	DRAWING REVISED AS PER MOM DATED 25.05.18			
01	22.05.18	ALTERED	SY	-SD-
		CHECKED	SK	-SD-
		APPROVED	DM/RS	-SD-
	DRAWING REVISED AS PER CUSTOMER COMMENTS DT. 01.12.16 AND MOM			

ADDITIONAL INFORMATION
W.O.No.

STATUS OF DRAWING

DISTRIBUTION OF PRINTS

ग्राहक/परियोजना का नाम
NAME OF CUSTOMER/PROJECT

THDC INDIA LTD.
4X111MW VISHNUGAD PIPALKOTI H.E. PROJECT

BHEL भारत हेवी इलेक्ट्रिकल्स लिमिटेड पारेषण व्यापार समूह
BHARAT HEAVY ELECTRICALS LTD.
TRANSMISSION BUSINESS GROUP

	नाम /NAME	हस्ता./SIGN.	दि./DATE
बनाया DRAWN	SY	-SD-	28.10.16
जाँचा CHECKED	SK	-SD-	
स्वीकृत APPROVED	AS	-SD-	

विभाग DEPT. TBEM | कोड CODE 422 | अनुपात / SCALE -- | कार्ड कोड CARD CODE -

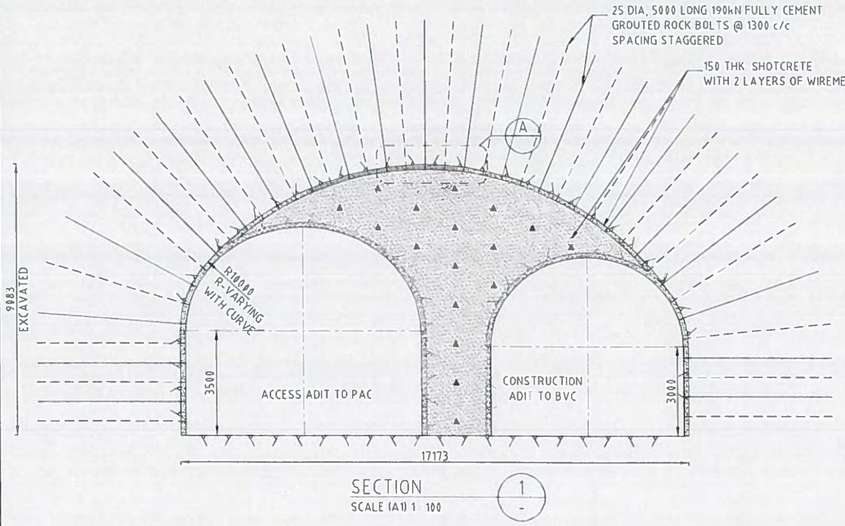
शीर्षक/TITLE
CONCEPTUAL LAYOUT FOR GIS FLOOR

ड्राईंग क्र./DRAWING NO. TB-0-382-316-014

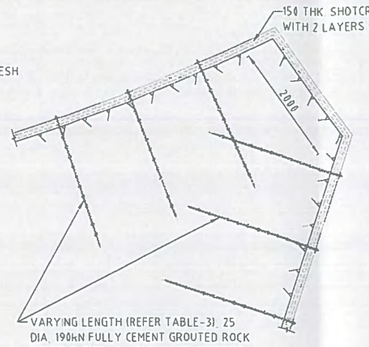
पृष्ठ क्र./SHEET No. 1 | अगला पृष्ठ/NEXT SHEET

पुनः/REV. 03

AO SIZE



SECTION 1
SCALE (A1) 1 : 100



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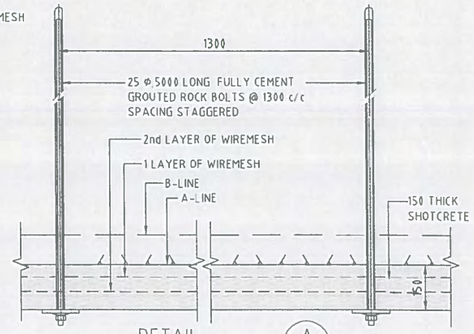
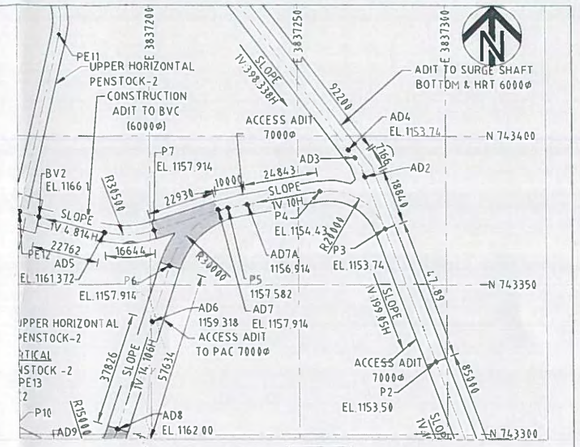
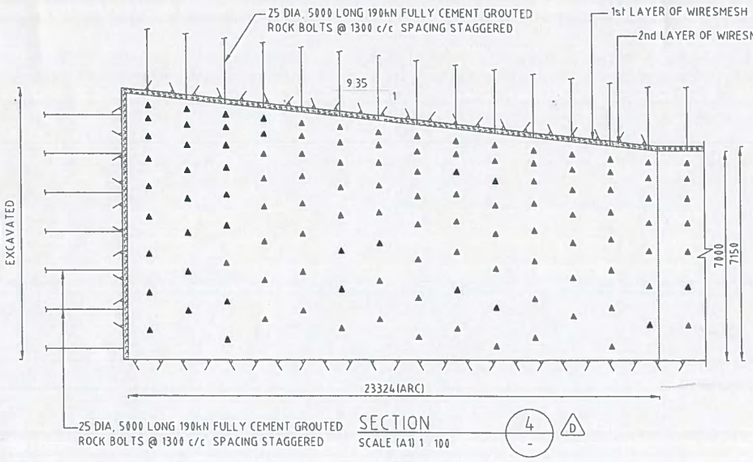


DETAIL A
SCALE (A1) 1 : 10



D KEY PLAN
LIMIT OF DRAWINGS



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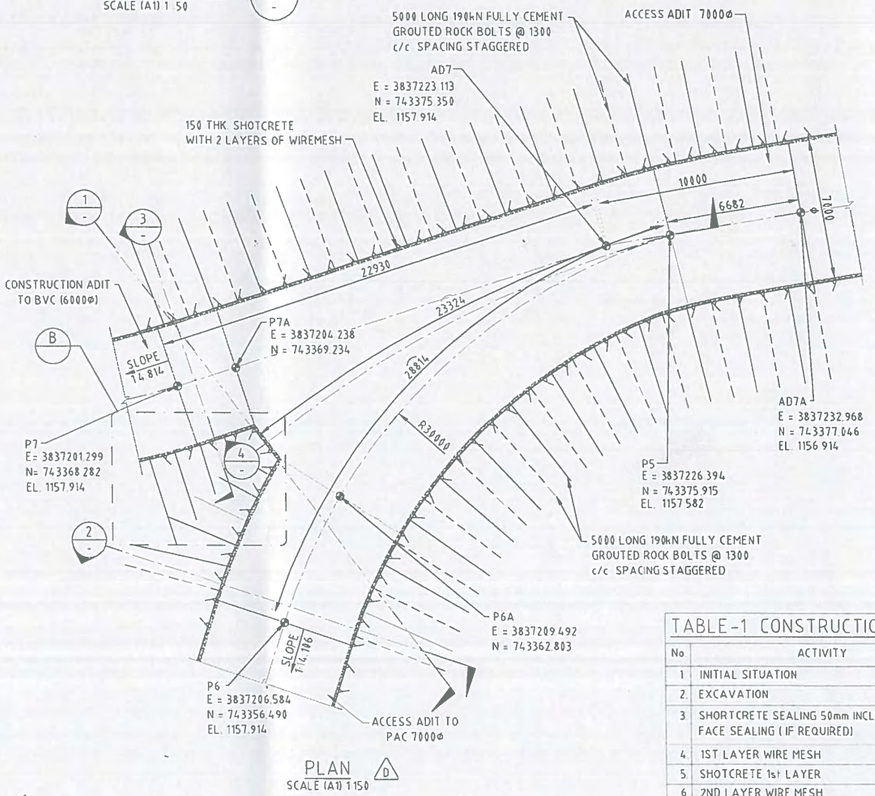
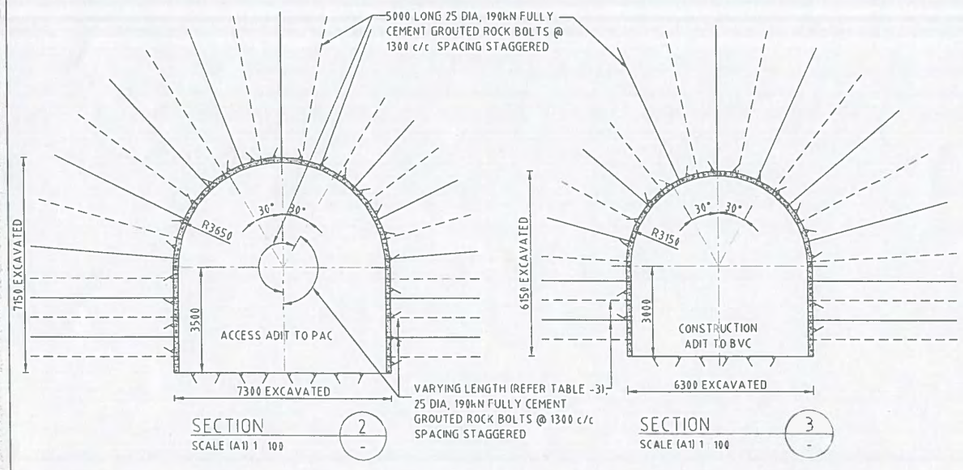
SCALE (A1) 1 : 100



PLAN D
SCALE (A1) 1 : 150



SECTION 2
SCALE (A1) 1 : 100

SECTION 3
SCALE (A1) 1 : 100

NOTES -

1. ALL DIMENSIONS ARE IN MILLIMETRES AND ELEVATION IN METRES, UNLESS OTHERWISE SPECIFIED.
2. NO DIMENSIONS SHALL BE SCALED, ONLY WRITTEN DIMENSIONS ARE TO BE TAKEN AS CORRECT.
3. FULLY GROUTED ROCK BOLTS SHALL BE USED.
4. LOCATION OF ROCK BOLTS, NOT PROTRUDING THE SHOTCRETE, SHALL BE MARKED ON THE SHOTCRETE AND THERE AFTER ON LINING.
5. ALL ROCK SUPPORTS AS PER CONSTRUCTION SEQUENCE SHALL BE PROVIDED BEFORE BLASTING OF SUBSEQUENT ROUND.
6. BLAST VIBRATION MONITORING SHALL BE CARRIED OUT AS PER TECHNICAL SPECIFICATION.
7. ORIENTATION & LOCATION OF ROCK BOLTS MAY BE MODIFIED BASED ON THE ACTUAL GEOLOGY OF THE AREA.
8. ADDITIONAL ROCK SUPPORT MAY BE INSTALLED AS PER SITE CONDITION.
9. SHOTCRETE, AS SPECIFIED SHALL BE APPLIED CONFORMING TO THE TECHNICAL SPECIFICATIONS.
10. THE TUNNEL SHALL BE LOGGED GEOLOGICALLY AS SOON AS POSSIBLE AND 3-D LOG PREPARED SHALL BE PROVIDED TO THE DESIGN DEPARTMENT ON DAILY BASIS.
11. A-LINE - MINIMUM EXCAVATION LINE & B-LINE - PAY LINE SHALL BE AS PER TS.
12. QUALITY CONTROL AND SAFETY PARAMETERS SHALL BE ENSURED DURING PROGRESS OF THE WORKS.
13. DRAINAGE HOLES SHALL BE PROVIDED WHEREVER REQUIRED.
14. ALL 25φ ROCKBOLTS SHALL HAVE THE MINIMUM STRENGTH OF 190kN THE STRENGTH OF BOLT SHALL BE CONFIRMED AT SITE THROUGH PULL OUT TEST
15. IN CASE ANY PERMANENT STRUCTURE IS LOCATED WITH IN 30 M DISTANCE, CONTROLLED BLASTING SHALL BE CARRIED OUT AS PER TECHNICAL SPECIFICATION.
16. THIS DRAWING SHALL BE READ IN CONJUNCTION WITH DRAWING NO 5061149-C535 TO C538 AND C601-C602.
17. ALL ROCK BOLTS SHOULD BE OF Fe500 STEEL.
18. THE CHAIN LINK WIREMESH SHALL CONFORM TO TECHNICAL SPECIFICATIONS CL 12.1 OF SECTION VI-B-11.

TABLE-1 CONSTRUCTION SEQUENCE

No.	ACTIVITY	ROUND
1	INITIAL SITUATION	n-1
2	EXCAVATION	n
3	SHORTCRETE SEALING 50mm INCLUDING FACE SEALING (IF REQUIRED)	n
4	1ST LAYER WIRE MESH	n
5	SHOTCRETE 1st LAYER	n
6	2ND LAYER WIRE MESH	n-1
7	SHOTCRETE 2ND LAYER 50 MM ONLY	n-1
8	INSTALLATION OF ROCK BOLT	n-2

TABLE-3
LENGTH OF ROCK BOLT FOR RESPECTIVE ROCK PILLAR WIDTH

ROCK PILLER WIDTH	LENGTH OF ROCK BOLT
2-3m	2.25m
3-4m	3.25m
4-5m	4.25m
5-6m	5.25m

TABLE-2
EXCAVATION AND SUPPORT SUMMARY
ROCK SUPPORT CLASS-II & III (RMR >40)

EXCAVATION	ROUND LENGTH	1.2-1.5m
SUPPORT	SHOTCRETE	C25, X=150mm
	FULLY CEMENT GROUTED ROCK BOLT	Fy = MIN. 190kN, 25MMφ
	WIRE MESH (REFER NOTE-18)	2 LAYERS

LEGEND
5.0m LONG 190kN FULLY CEMENT GROUTED ROCKBOLTS @ 1.3m c/c SPACING STAGGERED

SPACE FOR THDC STAMP

APPROVED
THDC INDIA LTD, RISHIKESH
UNIT:- DGE-CIVIL (VPHEP)
Mgr | Actg | CGM
26/04/22 Date
Drawing No. THDC/VPH P/C | SSP-18(R1)

No	Revision	SMEC	Date
D	REVISED AS MARKED (D)	P.A.	25.04.22
C	REVISED BIFURCATION CONFIGURATION	P.A.	20-02-19
B	REVISED AS PER CLIENT'S COMMENTS	P.A.	31-05-16
A	ISSUED FOR APPROVAL	P. A.	05-05-16

CLIENT
THDC INDIA LIMITED
(A Joint Venture of Govt. of India and Govt. of U.P.)
(A MINI RATNA COMPANY)

SCALES FOR A1
SCALE 1 : 10 — 100 0 100 200 300 400 500mm
SCALE 1 : 50 — 500 0 500 1000 1500 2000 2500mm
SCALE 1 : 100 — 1000 0 1000 2000 3000 4000 5000mm
SCALE 1 : 150 — 150 0 150 300 450 600 750mm
SCALE 1 : 1000 — 10000 0 10000 20000 30000 40000 50000mm

CONSULTANT
smec new logo.jpg
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Gurgaon - 122008 (Haryana)
Tel: 91-124-4552800 Fax: 91-124-4376018
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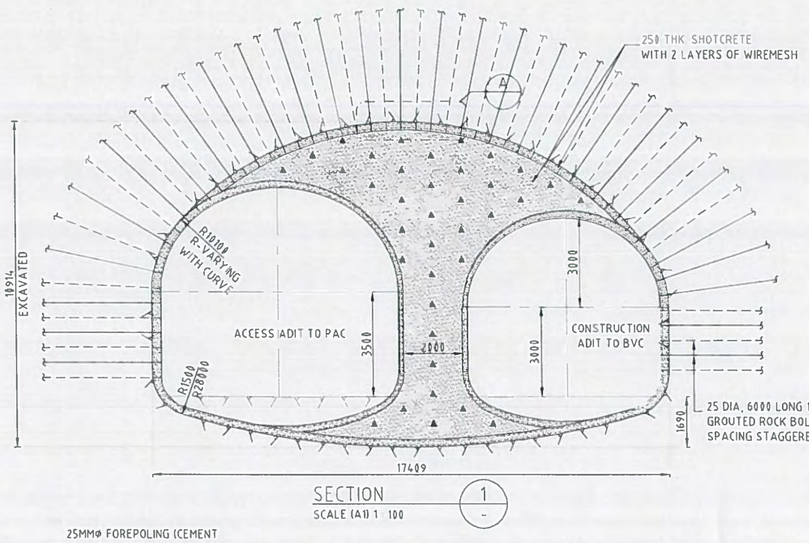
Website: www.smec.com.au

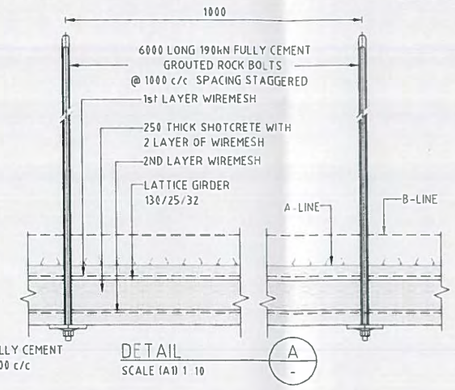
Drawn	May-16	Designed	May-16
A. R.		A.P.	
Drafting Check	May-16	Design Check	May-16
M.D.		S.N.	
SUBMITTED	May-16		
P.A.			

Client THDC INDIA LIMITED
Project VISHNUGAD PIPALKOTI H.E.P. (444 MW), UTTARAKHAND
Title JUNCTION OF CONS. ADIT B.V.C. WITH P.A.C. PRIMARY ROCK SUPPORT FOR ROCK CLASS-II & III

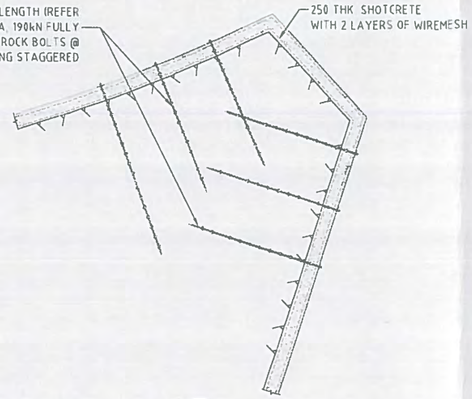
Original Size	Drawing Status	Drawing No.	Rev
A1	APPROVAL	5061149-C547	D



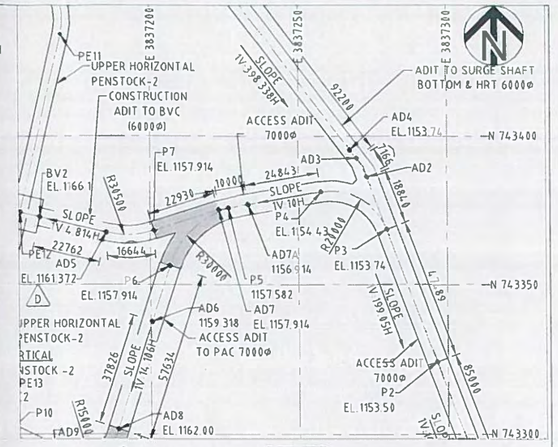
SECTION 1 / SCALE (A1) 1 : 100



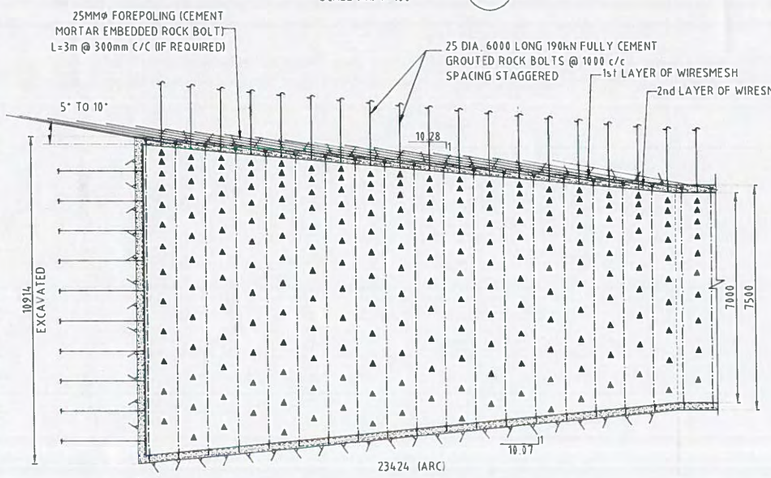
DETAIL A / SCALE (A1) 1 : 10



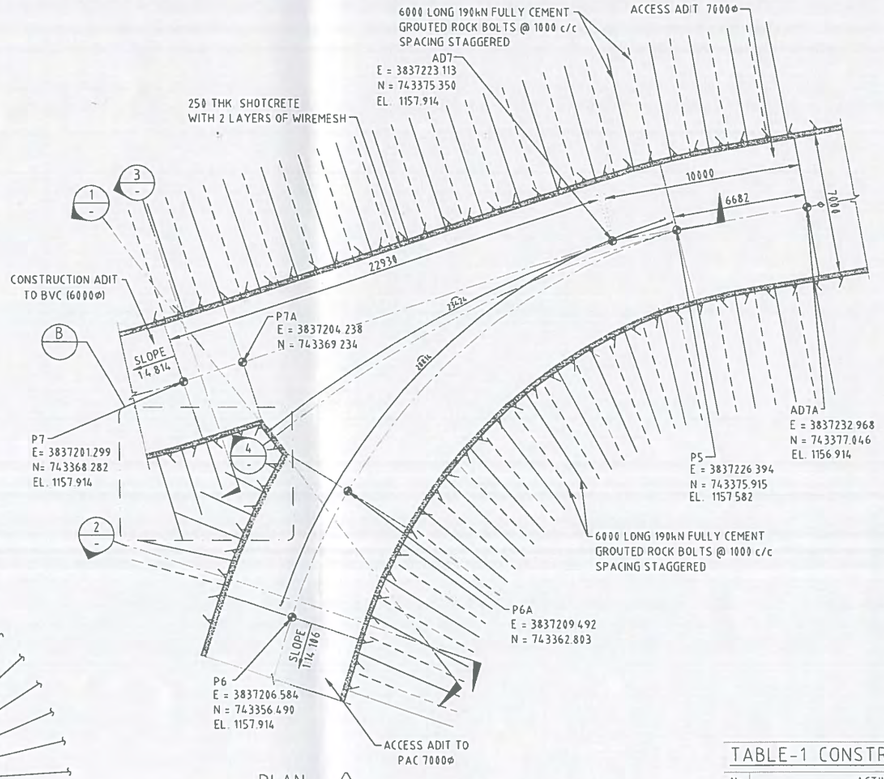
DETAIL B / SCALE (A1) 1 : 10



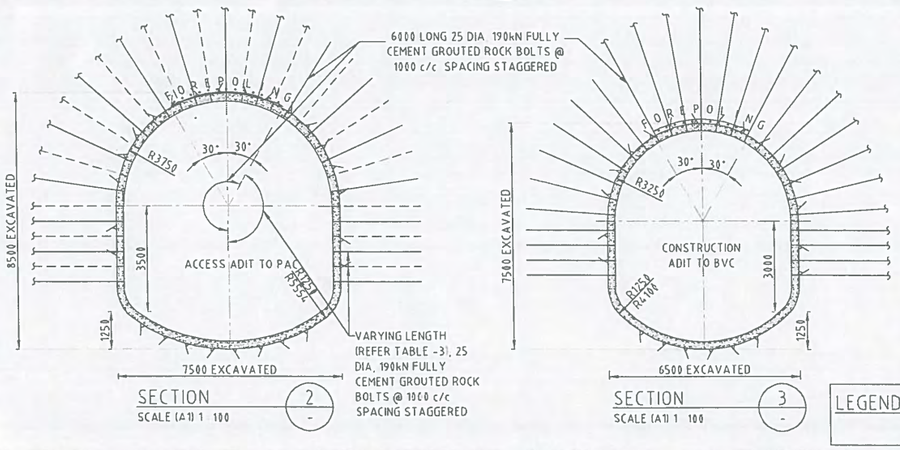
D KEY PLAN — LIMIT OF DRAWINGS



SECTION 4 / SCALE (A1) 1 : 100



PLAN D / SCALE (A1) 1:150



SECTION 2 / SCALE (A1) 1 : 100

SECTION 3 / SCALE (A1) 1 : 100

LEGEND :- △ 25mm DIA, 6.0m LONG 190kN FULLY CEMENT GROUTED ROCK BOLTS @ 1.0m c/c SPACING STAGGERED

NOTES :-

1. ALL DIMENSIONS ARE IN MILLIMETRES AND ELEVATION IN METRES, UNLESS OTHERWISE SPECIFIED
2. NO DIMENSIONS SHALL BE SCALED, ONLY WRITTEN DIMENSIONS ARE TO BE TAKEN AS CORRECT
3. FULLY GROUTED ROCK BOLTS SHALL BE USED.
4. LOCATION OF ROCK BOLTS, NOT PROTRUDING THE SHOTCRETE, SHALL BE MARKED ON THE SHOTCRETE AND THERE AFTER ON LINING
5. ALL ROCK SUPPORTS AS PER CONSTRUCTION SEQUENCE SHALL BE PROVIDED BEFORE BLASTING OF SUBSEQUENT ROUND.
6. BLAST VIBRATION MONITORING SHALL BE CARRIED OUT AS PER TECHNICAL SPECIFICATION.
7. ORIENTATION & LOCATION OF ROCK BOLTS MAY BE MODIFIED BASED ON THE ACTUAL GEOLOGY OF THE AREA.
8. ADDITIONAL ROCK SUPPORT MAY BE INSTALLED AS PER SITE CONDITION.
9. SHOTCRETE, AS SPECIFIED SHALL BE APPLIED CONFORMING TO THE TECHNICAL SPECIFICATIONS.
10. THE TUNNEL SHALL BE LOGGED GEOLOGICALLY AS SOON AS POSSIBLE AND 3-D LOG PREPARED SHALL BE PROVIDED TO THE DESIGN DEPARTMENT ON DAILY BASIS.
11. A-LINE - MINIMUM EXCAVATION LINE & B-LINE - PAY LINE SHALL BE AS PER TS.
12. QUALITY CONTROL AND SAFETY PARAMETERS SHALL BE ENSURED DURING PROGRESS OF THE WORKS.
13. DRAINAGE HOLES SHALL BE PROVIDED WHEREVER REQUIRED.
14. ALL 25Φ ROCKBOLTS SHALL HAVE THE MINIMUM STRENGTH OF 190kN THE STRENGTH OF BOLT SHALL BE CONFIRMED AT SITE THROUGH PULL OUT TEST
15. IN CASE ANY PERMANENT STRUCTURE IS LOCATED WITHIN 30 M DISTANCE, CONTROLLED BLASTING SHALL BE CARRIED OUT AS PER TECHNICAL SPECIFICATION.
16. THIS DRAWING SHALL BE READ IN CONJUNCTION WITH DRAWING NO 5061149-C535 TO C538 AND C601-C602.
17. ALL ROCK BOLTS SHOULD BE OF Fe500 STEEL.
18. THE CHAIN LINK WIREMESH SHALL CONFORM TO TECHNICAL SPECIFICATIONS CL.12.1 OF SECTION VI-B-11.
19. IN CASE ROCK CLASS V IS ENCOUNTERED AT SITE THE DESIGN DEPT SHALL BE INTIMATED IMMEDIATELY FOR FURTHER ACTION.

TABLE-2
EXCAVATION AND SUPPORT SUMMARY
ROCK SUPPORT CLASS-IV (RMR 21 <40)

EXCAVATION	ROUND LENGTH	1.0m
SUPPORT	SHOTCRETE	C25, X=250mm
	FULLY CEMENT GROUTED ROCK BOLT	Fy = MIN. 190kN, 25MMΦ
	WIRE MESH (REFER NOTE-18)	2 LAYERS

TABLE-3
LENGTH OF ROCK BOLT FOR RESPECTIVE ROCK PILLAR WIDTH

ROCK PILLER WIDTH	LENGTH OF ROCK BOLT
2-3m	2.25m
3-4m	3.25m
4-5m	4.25m
5-6m	5.25m

TABLE-1 CONSTRUCTION SEQUENCE

No	ACTIVITY	ROUND
1	INITIAL SITUATION	n-1
2	EXCAVATION	n
3	SHORTCRETE SEALING 50mm INCLUDING FACE SEALING (IF REQUIRED)	n
4	1ST LAYER WIRE MESH	n
5	INSTALLATION LATTICE GIRDER	n
6	SHOTCRETE 1st LAYER	n
7	FOREPOLING(FOR n+1)	n
8	2ND LAYER WIRE MESH	n-1
9	SHOTCRETE 2ND LAYER 100 MM ONLY	n-1
10	INSTALLATION OF ROCK BOLT	n-2

SPACE FOR THDC STAMP

APPROVED
THDC INDIA LTD. RISHIKESH
UNIT:- D&E CIVIL (VPHEP)
Mgr | AGM | CGM
26/04/22 Date
Drawing No. THDC/VPH P/C/SSP-19 (R1)

No	Revision	SMEC	Date
D	REVISED AS MARKED △D	P.A.	25.04.22
C	REVISED BIFURCATION CONFIGURATION	P.A.	20-02-19
B	REVISED AS PER CLIENT'S COMMENTS	P.A.	31-05-16
A	ISSUED FOR APPROVAL	P. A.	05-05-16

CLIENT
THDC INDIA LIMITED
(A Joint Venture of Govt. of India and Govt. of U.P.)
(A MINI RATNA COMPANY)

SCALES FOR A1
SCALE 1 : 5 — 50 0 50 100 150 200 250mm
SCALE 1 : 10 — 100 0 100 200 300 400 500mm
SCALE 1 : 20 — 200 0 200 400 600 800 1000mm
SCALE 1 : 100 — 1000 0 1000 2000 3000 4000 5000mm
SCALE 1 : 1000 — 10000 0 10000 20000 30000 40000 50000mm

CONSULTANT
smec new logo.jpg
1st Floor, West Wing, Novus Tower
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Drawn May-16	A.R.	Designed May-16	A.P.
Drafting Check May-16	M.D.	Design Check May-16	S.N.
SUBMITTED May-16	P.A.		

Client THDC INDIA LIMITED
Project VISHNUGAD PIPALKOTI H.E.P. (444 MW), UTTARAKHAND
Title JUNCTION OF CONS. ADIT B.V.C. WITH P.A.C. PRIMARY ROCK SUPPORT FOR ROCK CLASS-IV

Original Size	Drawing Status	Drawing No.	Rev
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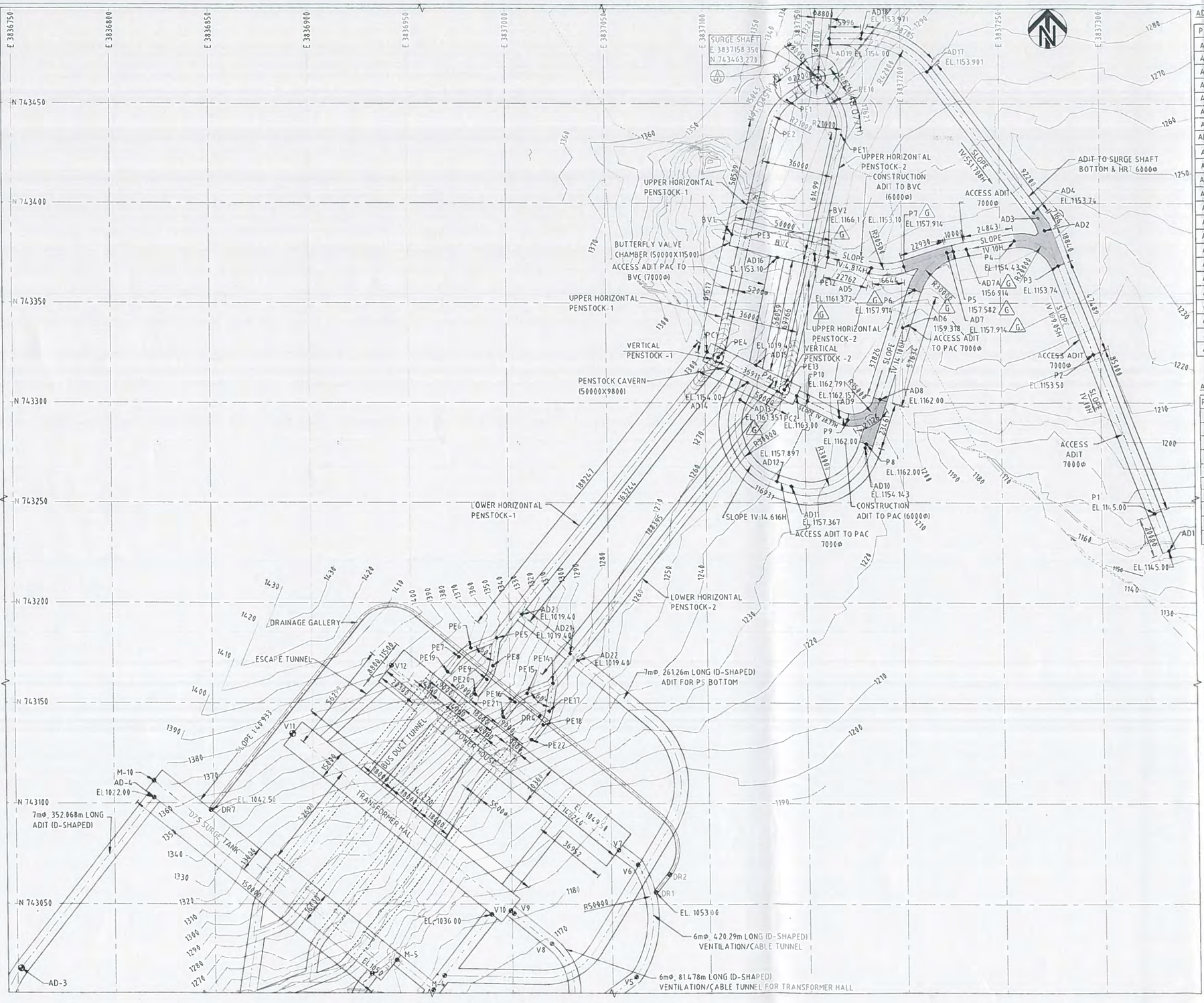

SURGE SHAFT TO MACHINE HALL GENERAL LAYOUT - PLAN

SCALE (A1) 1:1000

ADIT COORDINATES

POINT	EASTING	NORTHING	LEVEL
AD-1	3837333.388	743225.935	1145.00
AD-2	3837272.904	743386.236	1153.74
AD-3	3837269.455	743392.489	1153.74
AD-4	3837267.322	743395.310	1153.74
AD-5	3837184.874	743367.616	1161.372
AD-6	3837200.437	743337.660	1159.318
AD-7	3837223.113	743375.350	1157.914
AD-7A	3837232.968	743377.046	1156.914
AD-8	3837188.699	743301.702	1162.00
AD-9	3837167.849	743292.882	1162.157
AD-10	3837180.771	743277.416	1154.143
AD-11	3837142.943	743258.206	1157.367
AD12	3837135.570	743260.613	1157.897
AD13	3837117.579	743301.568	1161.351
AD14	3837121.471	743310.112	1154.00
AD15	3837125.753	743318.927	1019.40
AD16	3837137.072	743373.017	1153.10
AD17	3837213.852	743466.036	1153.901
AD18	3837180.349	743482.706	1153.971
AD19	3837164.352	743482.706	1154.10
AD20	3837006.382	743193.964	1019.40
AD21	3837030.282	743174.537	1019.40
AD22	3837034.318	743171.257	1019.40

PENSTOCK COORDINATES

POINT	EASTING	NORTHING	LEVEL
PE-1	3837142.555	743451.945	1155.00
PE-2	3837134.355	743439.714	1155.00
PE-3	3837120.880	743382.757	1153.10
PE-4	3837106.693	743322.795	1019.40
PE-5	3836993.706	743182.357	1019.40
PE-6	3836980.570	743177.266	1019.40
PE-7	3836974.470	743172.805	1019.40
PE-8	3836991.547	743168.436	1019.40
PE-9	3836988.495	743161.522	1019.40
PE-10	3837166.839	743451.115	1155.00
PE-11	3837170.072	743434.315	1155.00
PE-12	3837155.912	743374.468	1153.10
PE-13	3837139.849	743306.577	1019.40
PE-14	3837021.755	743159.791	1019.40
PE-15	3837008.619	743154.700	1019.40
PE-16	3837002.519	743150.238	1019.40
PE-17	3837019.596	743145.869	1019.40
PE-18	3837016.544	743138.955	1019.40
PE-19	3836968.544	743165.438	1019.40
PE-20	3836982.568	743154.155	1019.40
PE-21	3836996.593	743142.872	1019.40
PE-22	3837010.617	743131.589	1019.40

ADIT COORDINATES

POINT	EASTING	NORTHING	LEVEL
P1	3837326.320	743244.647	1145.00
P2	3837296.315	743324.175	1153.50
P3	3837279.554	743368.608	1153.74
P4	3837257.449	743381.260	1154.43
P5	3837226.394	743375.915	1157.914
P6	3837206.584	743356.490	1157.914
P7	3837201.299	743368.282	1157.914
P8	3837181.419	743279.400	1162.00
P9	3837172.151	743291.532	1162.00
P10	3837151.459	743300.898	1162.791

BVC & PAC COORDINATES

POINT	EASTING	NORTHING	LEVEL
BV1	3837114.068	743384.369	1153.10
BV2	3837162.724	743372.857	1166.1 / 1153.10
PC1	3837101.154	743325.504	1154.00
PC2	3837146.069	743303.535	1163.00/1154.00

NOTES

1. ALL DIMENSIONS ARE IN MM AND ELEVATIONS IN METER UNLESS OTHERWISE SPECIFIED.
2. DIMENSIONS SHALL NOT BE OBTAINED BY SCALING THE DRAWINGS ONLY WRITTEN DIMENSIONS SHALL BE FOLLOWED
3. THIS DRAWING SHALL BE READ IN CONJUNCTION WITH ALL RELEVANT DRAWINGS AND SPECIFICATION.
4. THIS DRAWING IS BASED ON THE CONTOURS & PORTAL LOCATION DETAIL PROVIDED BY THDCIL
5. THE LAYOUT AND CO-ORDINATE ARE AS PER THDCIL APPROVAL VIDE MAIL DATED- 07-04-2016.
6. LEVEL OF POINT AD-16 HAS BEEN MODIFIED AS PER M/S BHEL DRAWING NO. 12000019761 REV -0.
7. A PARAPET WALL AROUND THE SURGE SHAFT TOP MAY BE CONSTRUCTED UP TO LEVEL 1311m AS AN ADDITIONAL SAFETY TO CONTAIN THE UPSURGE FOR THE EXTREME DISCHARGE COEFFICIENT OF 0.9 FOR THE ORIFICE SLAB.

SPACE FOR THDC STAMP

APPROVED

THDC INDIA LTD. RISHIKESH
UNIT:- D&E CIVIL (VPHEP)

Mgr	AGM	CGM

26/04/22 Date

Drawing No. THDC/VPH P/C/SSP-14(R5)

No	Revision	SMEC	Date
G	REVISED AS MARKED	P.A.	25-04-22
F	REVISED AS MARKED	P.A.	09-07-21
E	REVISED AS MARKED	P.A.	26-11-20
D	REVISED AS MARKED	P.A.	06-11-20
C	ADIT ALIGMENT REVISED DUE TO SITE CONSTRAINT	P.A.	27-10-16
B	LEVEL OF POINT AD-1 CHANGED AS PER EXECUTED WORK	P.A.	27-07-16

CLIENT
THDC INDIA LIMITED
(A Joint Venture of Govt. of India and Govt. of U.P.)
(A MINI RATNA COMPANY)

SCALES FOR A1
SCALE 1:1000 — 10000 0 10000 20000 30000 40000 50000mm

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Drawn	Apr-16	Designed	Apr-16
B.S.		P.K.	
Drafting Check	Apr-16	Design Check	Apr-16
M.D.		V.G.	
SUBMITTED	Apr-16		
P.A.			

Client THDC INDIA LIMITED
Project VISHNUGAD PIPALKOTI H.E.P. (444 MW), UTTARAKHAND
Title POWER HOUSE COMPLEX
SURGE SHAFT TO MACHINE HALL
GENERAL LAYOUT - PLAN

Original Size	Drawing Status	Drawing No.	Rev
A1	APPROVAL	5061149-C601	G

Contents

SECTION 2:

EQUIPMENT SPECIFICATION UNDER SCOPE OF SUPPLIES/ SERVICE

1. DESIGN BASIS REPORT
2. CUSTOMER TECHNICAL SPECIFICATION

The precedence of order for documents shall be as per follows,

1. Design basis report
2. Customer Technical Specification

1098921/2022/TBG-TB_ENGG_PA

Approval of this drawing/document does not absolve contractor of its responsibility for manufacturing of the equipment as per ER & GTP for the achievement of designed performance at site and completeness of the equipment.

BHARAT HEAVY ELECTRICALS LIMITED
TRANSMISSION PROJECTS ENGINEERING MANAGEMENT

DOCUMENT No.	**TB-382-316-058**	**Rev. 05**	Prepared	Checked	Approved
TYPE OF DOC.	**DESIGN BASIS REPORT**	**NAME**	**SK**	**SK**	**AS/ RS**
TITLE:		**SIGN**	-sd-	-sd-	-sd-
DESIGN BASIS REPORT of 420kV (Um) XLPE		**DATE**	02.02.17	02.02.17	02.02.17
Cable & its accessories		**GROUP**	TBEM	**W.O. No**	-
CUSTOMER:	**THDC INDIA LIMITED, UTTARAKHAND**				
PROJECT:	**4X111MW VISHNUGAD PIPALKOTI HYDRO ELECTRIC PROJECT**				

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CONTENTS

Sec. No.	Description	
1.	Introduction	
2.	Basic arrangement and layout	
3.	Standard and codes	
4.	Cable parameters	
5.	General design aspects	
6.	Guaranteed power losses in cable	
7.	Construction and materials	
8.	Schedule of requirements and quantities	
9.	Tests	
10.	Training	
11.	Documents attached	

Rev. No.	Date	Altered	Checked	Approved	REVISION DETAILS
05	**29.08.22**	**DK**	**VK**	**AG**	**As per meeting held with THDCIL on dtd. 25-26.08.22.**
04	26.07.22	DK	VK	AG	As per MOM with THDC dtd. 20.05.19.
03	18.01.18	SK	SK	DM/RS	As per THDC letter dtd. 25.09.17.
02	31.08.17	SK	SK	DM/RS	As per THDC letter dtd. 06.07.17.
01	12.06.17	SK	SK	DM/ RS	As per THDC letter dtd. 07.03.17.

Distribution	To	TBTS	O/C	TBMM	TBQM	TBCM
	Copies	-	1	-	-	-

जाँची गई/CHECKED
RECOMMENDED / संस्तुत
APPROVED / अनुमोदित

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THDC India Limited, Rishikesh

Doc. No. TB-382-316-058, REV 05
Title: Design Basis Report of 420kV (Um) XLPE cable & its accessories
Project: 4x111MW Vishnugad Pipalkoti Hydro Electric Project

1.0 INTRODUCTION:

420kV(Um) XLPE Cables is a part of 4X111MW Vishnugad Pipalkoti Hydro Project and BHEL is the EPC contractor for this project.

The scope includes design, engineering, manufacturing, testing at manufacturer's works before dispatch, transport, storage, erection, testing and commissioning at site, and handing over based on technical specification of M/s THDCIL and tender drawings.

The scope comprises of 420kV(Um) single core conductor of 800sqmm copper cross sectional area, Cross Linked Polyethylene (XLPE) Insulated cables and its accessories. The accessories shall comprise of cable end terminations suitable for SF6 gas termination at GIS end & outdoor sealing termination at pothead yard end, supporting structures & fixtures, cable racks along with all necessary supporting arrangement, clamps & plate spacers required for cable laying, Aluminum blocks to snake the cables properly, hardwares, earthing materials as required for complete earthing etc.

The purpose of Design Basis Report document is to elaborate the following for 420kV(Um) XLPE cables & its accessories.

a) Basic arrangement and layout
b) Standard and codes
c) Cables parameters
d) General design aspects
e) Guaranteed power losses in cable
f) Construction and material
g) Schedule of requirements and quantities
h) Test
i) Training

2.0 BASIC ARRANGEMENT AND LAYOUT:

a) Two nos. 420kV outgoing GIS line feeder bays located at **EL 1046 (tentative)** shall be connected to 420kV pothead yard located at **EL 1100 (tentative)** by 1Cx800sqmm Copper conductor XLPE cable per phase running inside the cable tunnel.

b) Spare 1Cx800sqmm Copper conductor XLPE cable shall run between two nos. GIS line feeders and pothead yard. Spare cables shall be placed on GIS floor with end cap without termination at GIS end and on ground with end cap without termination at pothead yard end. Spare cable shall be kept beyond the farthest end at both side, so that it may be connected to any phase whenever required as per future requirements.

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c) **Refer attached Annexure-1 (Typical cable arrangement in tunnel)** for cable arrangement of 7runs of 1Cx800sqmm Copper conductor XLPE cable of core inside cable tunnel, however this typical arrangement does not include Earthing Continuity Cable as of now, but it shall be covered during detailed engineering stage. 1Cx800sqmm, 420kV (Um) XLPE cable shall run on GI rack assembly arrange without cable tray in tunnel.

3.0 STANDARD AND CODES:

The design, material, manufacture, inspection, testing and performance of XLPE cables and its accessories covered under the scope of these specifications shall be in accordance with the latest editions of the following IEC / IS and other publications:

Sl. No.	Applicable Standards	Detailed description
1.	IEC 60060	High Voltage Test Techniques Part –1
2.	IEC 60187	General definitions and test requirements
3.	IEC 60068	Seismic test methods for equipment
4.	IEC 60137	Bushings for alternating voltage above 1000V (Outdoor bushing)
5.	IEC 60183	Guide to the selection of high voltage cables
6.	IEC 60228	Conductors of insulated cables.
7.	IEC 60229	Tests on cable over sheaths which have a special Protective function and are applied by extrusion.
8.	IEC 60230	Impulse tests on cables and their accessories.
9.	IEC 60270	Partial discharge measurements.
10.	IEC 60287	Calculations of the continuous current rating of cables
11.	IEC 60332	IEC 60332 Tests on electric cables under fire Part – I conditions – Test on a single vertical insulated wire or cable
12.	IEC 60376	Specifications & acceptance of new Sulphur Hexaflouride (SF6) Gas
13.	IEC 60506	Switching impulse test on EHV insulators
14.	IEC 60540	Test methods for insulations and sheaths of electric cables and cords.
15.	IEC 60811 part-1 (Sec-1)	Common test methods for insulating and sheathing materials of electric cables) - Methods for general application - Measurement of thickness and overall dimensions – Tests for determining the mechanical properties.

16.	IEC 60811 part-1 (Sec-2)	Common test methods for insulating and sheathing materials of electric cables – Methods for general application- Thermal ageing methods.
17.	IEC 60811 part-1 (Sec-3)	Insulating and sheathing materials of electric cables- Common test methods – General application – Methods for determining the density – Water absorption test-Shrinkage test.
18.	IEC 60811 part-1 (Sec-4)	Common test methods for insulating and sheathing materials of electric cables – Methods for general application – Tests at low temperature.
19.	IEC 60811 part-2 (Sec-1)	Insulating and sheathing materials of electric and optical cables – Common test methods – Methods specific to elastomeric compounds – Ozone resistance, hot set and mineral oil immersion tests.
20.	IEC 60811 part-3 (Sec-1)	Common test methods for insulating and sheathing materials of electric cables – Methods specific to PVC compounds – Pressure test at high temperature -Tests for resistance to cracking.
21.	IEC 60811 part-3 (Sec-2)	Common test methods for insulating and sheathing materials of electric cables – Methods specific to PVC compounds – Loss of mass test – Thermal stability test.
22.	IEC 60811 part-4 (Sec-1)	Common test methods for insulating and sheathing materials of electric cables – Methods specific to Polyethylene (PE) and polypropylene (PP) compounds – Resistance to environmental stress cracking – wrapping test after thermal ageing in air – Measurement of the melt flow index – Carbon black and / or mineral content measurement in PE.
23.	IEC 62271-209:2007	Cable connections for gas insulated metal enclosed switchgear
24.	IEC 60885 part–3	Electrical test methods for electric cables – Test methods for partial discharge measurements on lengths of extruded power cables.
25.	IEC 5831	PVC Compound
26.	IEC 62067	Power cables with extruded insulation and their accessories for rated voltages above 150 kV (Um=170 kV) upto 500 kV (Um=550 kV) – Test methods and requirements
27.	IS 72	Galvanizing of steel structure
28.	IS 1893	Criteria for earthquake resistance design of structure

29.	IS 2062	Structural steel (standard quality).
30.	IS 2633	Methods for testing uniformity of coating in Zn-coated articles
31.	IS 5561	Electric power connectors.
32.	ANSI / IEEE	Guide for Electrical safety and Std 80-1986 sub-station grounding"

4.0 CABLES PARAMETERS:

Sl. No.	Description	Parameters
1.	Type of cable	420kV (Um), 1Cx800sqmm copper equivalent cross sectional area conductor, extruded cross-linked polyethylene (XLPE) insulated, & corrugated aluminium/ laminated aluminium tape-sheathed and flame retardant PVC/PE/**HDPE** outer sheathed cable suitable for indoor / outdoor installation (natural air ventilated cable tunnel, underground GIS hall and pothead yard).
2.	No. of Phases per circuit	3
3.	Rated voltage, kVrms	420
4.	Highest system voltage, kVrms	420
5.	Frequency, Hz	50±3%
6.	Rated Short circuit withstand current at a rated voltage for 1 sec. kArms	Not less than 40
7.	Dynamic short circuit withstand, kApeak	100
8.	Rated Lightning impulse withstand voltage, kVpeak	1425
9.	Rated Switching impulse withstand voltage to earth, kV(peak)	1050
10.	Rated One minute power frequency withstand voltage to earth, kV(rms)	630

11.	Limits of temperature rise for conductor, XLPE insulation and sheath.	As per IEC
12.	Material of insulation	Extruded Cross-linked polyethylene (XLPE)
13.	Insulation screen / bedding	Extruded semiconducting compound semiconductor tape
14.	Longitudinal water barrier(i.e. Bedding)	Copper wires (woven fabric tape) with swelling compound/ water barrier tape to form water protection barrier.
15.	Material of Conductor	Copper
16.	Copper equivalent cross-sectional area of conductor, sqmm	800
17.	Shape of conductor	stranded Circular single/ segmented circular
18.	Conductor screen	bedding Semi-conducting material/ extruded layer of semiconducting compound
19.	Maximum resistance of conductor at 20 deg C	0.0224 Ω/km
20.	Metallic sheath (i.e. Inner sheath (material)	Extruded corrugated aluminium/ laminated aluminium tape
21.	Outer protective sheath	Flame retardant Poly-vinyl Chloride (PVC)/ Polyethylene (PE)/ High Density Polyethylene (HDPE), subject to following, subject to following, -Oxygen index shall be 24% (min.) -Flammability test shall be carried out as per IEC 332-1.
22.	Type of metallic sheath earthing at GIS end	Solidly earthed through Disconnecting link box/ Cable covering protection unit (CCPU) with surge voltage limiter (SVL)
23.	Type of metallic sheath earthing at pothead yard end	Solidly earthed through Disconnecting link box/ Cable covering protection unit (CCPU) without surge voltage limiter (SVL)
24.	Ambient temperature	40 Deg C
25.	Partial discharge level for routine test	≤10pC at 1.5Un/√3=345kV

26.	Partial discharge level for type test	≤5p Cat1.5 Un /√3 = 345kV
27.	Corona extinction voltage	Not exceeding 320kVrms
28.	Radio interference voltage (at 266kV rms)	Not exceeding 500 micro volts
29.	Operating temperature of conductor	
	a) Maximum Temperature rise over ambient temperature of 40°C	52°C
	b) Maximum permissible temperature during normal operation	90°C
	c) Maximum permissible temperature during overload	100°C
	d) Maximum permissible temperature during short circuit	250°C
30.	Maximum electric stress during normal operation	
	a) On the internal semi-conducting layer	16 kV/ mm
	b) On the outer semi-conducting layer	7 kV / mm

Note:

1. Minimum thickness of insulation, metallic sheath, and outer sheath shall not be less than 95% of guaranteed value.
2. Altitude correction factor will be applied for outdoor termination and outdoor pothead equipment.

5.0 GENERAL DESIGN ASPECTS:

a) Design of 420kV(Um) XLPE cable systems shall be such that a life expectancy of min. 35 years is achievable.

b) 420kV(Um) XLPE insulated cables for all two (2) outgoing circuits shall be installed in the same tunnel which is naturally ventilated and no forced ventilation cooling is envisaged.

c) Each 420kV(Um) XLPE insulated cable of 800sqmm copper conductor cross sectional area shall be supplied in single suitable length as much as possible keeping in mind the site constraint.

d) 420kV(Um) XLPE insulated cables shall be securely supported for the entire length with a suitable device to maintain continuous equal space between the cable supporting structures/ racks assembly in tunnel.

e) Cables shall be laid on cable rack without trays. The cables must be installed in a snaked shape, preferably, to absorb the thermal expansion and contraction of the cables or suitable arrangements shall be provided in the cable laying so as to compensate the thermal expansion and contraction for temperatures varying from -7°C to max. operating temperature 40°C.

f) Altitude correction factor shall not be applicable for 420kV(Um) XLPE cables and GIS end termination due concealed and complete covered design, however, it shall applicable for outdoor pothead equipment and including cable sealing end, because it is projected in air.

g) Pre-commissioning testing shall be performed on the spare 420kV(Um) XLPE cable also by connecting it to any one of the outgoing GIS feeder bays or any other suitable method.

h) Metal clamps, blocks for snaking, spacers for XLPE cable and other metallic parts, which tends to eddy current induced by current flowing in cable, shall be necessarily of non-magnetic materials.

i) The cable end terminals and supporting structures shall be designed for operation in seismic zone for earthquake resistance. The seismic loads occur due to the horizontal and vertical accelerations which may be assumed to act non concurrently. The coefficients for horizontal acceleration as 0.38g and vertical acceleration as 0.19g shall be considered for design purposes. The seismic loads shall be equal to static loads corresponding to the weight of the parts/ accessories multiplied by the acceleration coefficient.

j) All the detailed design calculations as per clause no. 11.13.3 and clause no. 11.12.2 of 420kV(Um) XLPE cable technical specification shall be submitted after placement of purchase order.

k) The guaranteed parameters of 420kV(Um) XLPE cable including losses, voltage drop and protection requirements shall depend on length of cable, laying and operating conditions of 420kV(Um) XLPE cables, however same shall be submitted after placement of purchase order.

l) Linear heat sensor (LHS) for cable shall be provided based on zonal fire protection of 420kV(Um) XLPE cable running inside the tunnel. The design and supply of LHS cable for fire protection of tunnel shall be taken care by BHEL PE&SD Hyderabad unit. Cable clamps suitable for flat formation for fixing on cable rack assembly of 420kV(Um) XLPE cable shall be provided.

6.0 GUARANTEED POWER LOSSES IN CABLE:

The guaranteed power losses in 420kV(Um) XLPE cable for estimate route length of 400m are mentioned below in line with contract specification,

a)	Guaranteed power loss in conductor in each length of 400m approx. or as required (without tolerance) conductor temperature of 90° C.	21842.4W for 400m
b)	Guaranteed dielectric power loss in each length of 400m approx. or as required (without tolerance) conductor temperature of 90°C.	1199.28W for 400m
c)	Guaranteed power loss in metallic sheath for each length of 400 m approx. or as required (without tolerance) at conductor temperature 90°C	3971.76W for 400m
d)	Guaranteed total power losses in each length of 400m approx. or as required (without tolerance) conductor temperature of 90° C (a+b+c)	27013.44W for 400m
e)	Max. permissible iron losses in supporting structures	Not applicable

Note: However, in actual supplied 420kV(Um) XLPE cable, if it is found that actual losses are more than the values guaranteed above, penalty shall be levied/ recovered at the rate of INR 1,50,000 (INR One lakh fifty thousand)/ KW.

7.0 CONSTRUCTION AND MATERIAL:

The typical construction and material for XLPE cable shall be as follows, however, the exact and firm technical details and drawings shall be submitted for approval at later stage after placement of order.

a) Conductor:

Conductor shall consist of uncoated annealed copper wires in accordance with IEC 60228 or equivalent and the shape shall be compacted or segmented circular. The total cross-sectional equivalent area of copper conductor shall not be less than 800sqmm.

b) Conductor shielding:

Conductor shielding shall consist of extruded cross-linked semi-conducting compound applied over the conductor which shall be firmly bonded to the inner surface of the insulation layer.

c) Insulation:

Insulation shall consist of Extruded, dry cured and Nitrogen/ silicon oil cooled cross-linked polyethylene (XLPE).

d) Insulation Shielding:

Insulation shielding shall consist of extruded cross-linked semiconducting compound and shall firmly be bonded to the insulation.

e) **Longitudinal water barrier/ bedding:**

Bedding shall consist of cushion layer of a semi conducting tape(s) to absorb the thermal expansion and contraction of the extruded layers during operation, water barrier tape / swelling compound to form water protection barrier and a copper woven semi-conducting fabric tape(s) applied over the extruded semi-conducting insulation shielding with a suitable overlap.

f) **Inner sheath (Metallic sheath):**

Cable inner sheath shall consist of extruded and corrugated aluminum/ laminated aluminum tape in accordance with relevant IEC or equivalent standards.

g) **Outer Sheath:**

Outer sheath shall consist of extruded black and flame retardant PVC/ PE/ HDPE compound in accordance with relevant standards.

An outer co-extruded polymeric coating with conducting properties (long lasting coating such as graphite etc.) shall be applied to the outer sheath as an electrode for the voltage test on the extruded PVC outer sheath.

h) **Outdoor Sealing End Termination:**

Outdoor sealing end shall be **pre-molded type**. The housing of the outdoor sealing end shall be porcelain/ epoxy resin of uniform quality and shall have sufficient strength against mechanical, electrical and thermal stresses.

The colour of porcelain / epoxy resin insulator shall be brown and the minimum creepage distance in millimeters per unit of the highest voltage shall be minimum 25mm/ kV.

The outdoor sealing end shall be insulated from the supporting structures.

i) **SF6 Indoor Termination / Sealing End:**

Indoor sealing end shall be pre-fabricated type. The housing of the SF6 indoor termination/ sealing end shall be of porcelain/ epoxy resin insulator type suitable for use with SF6 gas and shall have sufficient strength against mechanical, electrical and thermal stresses.

j) **Disconnecting link box (CCPU):**

Disconnecting links shall be provided to both sealing ends to facilitate periodical checking of the integrity of the outer sheath.

The outdoor terminal end shall have suitable type of disconnecting link box known as Cable Covering Protective Unit (CCPU) to disconnect the earthing circuit during testing **without sheath voltage limiter.** The GIS side indoor terminal end shall have disconnecting link box (CCPU) for direct earthing **with sheath voltage limiter.** The disconnecting link box shall be mounted on galvanised supporting steel structure and provided for each circuit

individually. The protective device (sheath voltage limiter) shall be of non-linear resistor type and shall be made of zinc oxide compound.

k) Earthing Continuity Cable/ Bonding Cable

Bonding cable shall be used for earthing the metallic sheath of XLPE insulated power cables to disconnecting link box and then to earthing ground from disconnecting link box. Earthing continuity cable shall be used for equalizing earth level between disconnecting links. Construction and materials of bonding cable shall comply with relevant IEC or equivalent standards and the cross-sectional area shall have enough size to withstand the specified short circuit rating i.e. 40 kA for 1 sec of the cable system.

l) Termination/ Sealing End Supporting Structure

Supporting structure for outdoor termination/ sealing end shall consist of galvanized steel members. The supporting structure shall be supplied complete in all respect with necessary embedment, hardware, earthing material etc. The zinc coating shall be uniform, clean, smooth and free from spangle as possible. The zinc coating shall weigh not less than 0.61 Kg/sqm over the area covered and not less than 0.09 mm in thickness.

m) Cable Racks, Supports and Accessories

The XLPE cables from the GIS hall to pothead yard shall be laid on tunnel and supported on GI cable rack assembly without tray.

n) XLPE Cable Clamps

The rising portion of cables at both ends (bent portion) and the intermediate portion shall be clamped with single way aluminium cleats. The material of cleats shall be aluminium alloy in accordance with relevant IEC/IS or equivalent standards.

8.0 SCHEDULE OF REQUIREMENTS AND QUANTITIES:

8.1 Main Items

Tentative quantities of 420kV(Um) XLPE cable and its accessories for two nos. 420kV(Um) three phase cable circuits and one spare cable with initial route length of 400m are considered, however, as per further input from site, the estimated route length is 600m, based on which schedule of quantities are revised.

Sl. No.	Description	Quantities
1.	420kV(Um), 1Cx800sqmm Copper conductor XLPE cable	4200m
2.	Bonding cable along with accessories	100m
3.	Earthing continuity cable along with accessories	1400m
4.	420kV(Um), Indoor GIS Sealing/ Termination End Kit, compatible for 420kV(Um), 1Cx800sqmm, Copper conductor, XLPE cable (1 set= 1-phase termination requirements)	6 set

5.	420kV(Um), Outdoor Cable Sealing/ Termination End Kit, compatible for 420kV(Um), 1Cx800sqmm, Copper Conductor XLPE cable (1 set= 1-phase termination requirements)	6 set
6.	1nox3-phase Disconnecting Link Box (CCPU) with SVL at GIS end side (1 Set= 3-phase)	2 set
7.	1x1-phase Disconnecting Link Box (CCPU) without SVL at Cable Sealing end side (1 Set= 1-phase)	6 set
8.	Supporting Structure for Termination/ Sealing End (1 Cable Circuit= Complete structure requirement for 1 cable circuit)	2 cable-ckt
9.	Single way non-magnetic aluminium clamps	1 Lot
10.	Miscellaneous Items including cable route marker, suitable earthing materials (earthing electrode, earthing terminals, bi-metallic clamps, washers, lugs, pads, hardware etc.) for connection to ground mat risers/ electrode, aluminium blocks for cable snaking, cable spacers, cable suspension devices, cable identification tags, embedment, hardware etc. required for 420kV(Um) XLPE cable system (1 lot=complete requirement for package)	1 Lot
11.	Consumables with limited shelf life including wiper, solvent for cleaning, tissue paper etc. and other repair materials for outer sheath etc. required for 420kV(Um) XLPE cable system (1 lot=complete requirement for package)	1 Lot
12.	Tools, tackles & equipment required for operation and maintenance of 420kV(Um) XLPE cable system (1 lot=complete requirement for package)	1 Lot

8.2 Mandatory spare

Sl. No.	Description	Quantities
1.	Bonding cable along with accessories	100m
2.	420kV(Um), Indoor GIS Sealing/ Termination End Kit, compatible for 420kV(Um), 1Cx800sqmm, Copper conductor, XLPE cable (1 set= 1-phase termination requirements)	2 Set
3.	420kV(Um), Outdoor Cable Sealing/ Termination End Kit, compatible for 420kV(Um), 1Cx800sqmm, Copper Conductor XLPE cable (1 set= 1-phase termination requirements)	2 Set
4.	420kV(Um), Straight Through Jointing kit, compatible for 420kV(Um), 1Cx800sqmm, Copper Conductor XLPE cable (1 set= 1-phase termination requirements)	1 Set
5.	1nox3-phase Disconnecting Link Box (CCPU) with SVL at GIS end side	2 Set

	(1 Set= 3-phase)	
6.	1nox1-phase Disconnecting Link Box (CCPU) without SVL at Cable Sealing end side (1 Set= 1-phase)	6 Set
7.	Additional spare item over and above mandatory spares of 420kV(Um) XLPE cable system (mandatory spares for five years of normal operation and maintenance for 420kV(Um) XLPE system) (1 lot=complete requirement for package)	1 Lot

8.3 Recommended spare of cables – Nil

8.4 General/ special tools & tackles, testing instruments required for erection, testing & Commissioning, Operation & Maintenance

All general/ special tools, tackles, slings, testing instrument etc. required for handling, pulling, laying, installation, testing and commissioning of the XLPE cables and accessories shall be arranged by its OEM/ Manufacturer on returnable basis.

However, manufacturer shall supply two sets of hand tools along with racks for holding them in new and unused condition to be used only for the maintenance of the cables and accessories during its useful life. A list of such maintenance tools & tackles shall be provided during detailed engineering stage.

Note:

1. Size of bonding cable shall be intimated after ordering of cables.
2. Detailed break-up of above Lot items shall be provided after ordering of cables.
3. The above quantities are tentative, which shall be decided and finalized jointly with vendor after placement of purchase order after route survey at site.
4. Any additional quantity other than mentioned in contract specification shall be payable by customer/ THDC.

9.0 TESTS:

9.1 Type test

Following type test reports from NABL laboratory, as specified in IEC 62067 (amended up to date) shall be submitted for 420kV(Um) XLPE cable and its accessories. The validity of type test reports shall be per CEA guidelines, amended time to time.

The complete type test certificates and data sheets for cables and its accessories shall be furnished by vendor. If the tests conducted are not to the satisfaction of BHEL/ consultant/ customer, the tests shall be re-conducted by vendor without any commercial implication to BHEL.

a) Check on insulation thickness as per IEC 60811 (check of cable construction).

b) Tan δ measurement.

c) Partial discharge test after complete assembly of end terminations

i) at ambient temperature

ii) at high temperature (90^0C)

d) Cable bending test followed by installation accessories and partial discharge test at ambient temperature.

e) Switching impulse voltage withstand test as per IEC 60230/ 62067.

f) Lightning Impulse voltage withstand test followed by power frequency voltage test as per IEC 62067/ 60230.

g) Ageing treatment as per IEC 60811.

h) Tests for determining the mechanical properties of insulation and outer sheath before and after ageing

i) Heat cycle voltage test as per IEC 62067.

j) Flame retardant test on outer sheath.

k) Oil resistant test on outer sheath.

l) Measurement of hardness of outer sheath.

m) Abrasion test on outer sheath.

n) Insulation shrinkage test.

o) Measurement of resistivity of semiconducting screens as per IEC 62067.

p) Conditioning & mechanical test as per IEC 60811.

q) Loss of mass test on PVC over sheath.

r) Pressure test at low & high temperatures on over sheaths.

s) Heat shock test on over sheath.

t) Hot set test for XLPE insulation.

u) Measurement of carbon black contents in PE over sheath.

v) Water penetration test.

w) Annealing test (for copper)

9.2 Routine and sample test

All applicable test as per IEC 62067hall be carried out, however, dimension check and conductor resistance test as per contract specification shall also be included.

9.3 Site test

Following site test as per Clause 14 of IEC 62067, if applicable shall be conducted after laying of cable and installation of accessories.

a) DC voltage test of the over sheath (Cl 14.1 of IEC 62067)
b) AC voltage test of the insulation (Cl 14.2 IEC 62067)
c) Partial discharge measurement test

9.4 Test for Loss Measurement

Test for loss measurements (as per contract clause 11.10.6), samples tests and final acceptance test as per IEC 62067 shall be carried out on 420kV(Um) XLPE cables.

10.0 TRAINING:

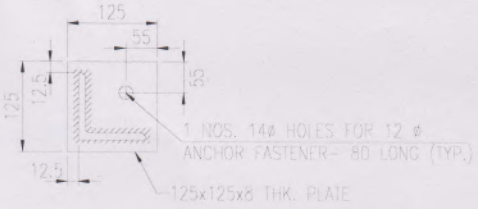
The scope of work shall also include training of THDCIL engineers at the works of manufacturer as well as at project site as per following details,

Training for XLPE cable & accessories of 4nos. Engineers for a period of at least 7 working days at Manufacturer's works	To and fro travelling charges, lodging and boarding charges of engineer shall be in THDCIL scope. Only training shall be arranged at manufacturer works.	Lot	1

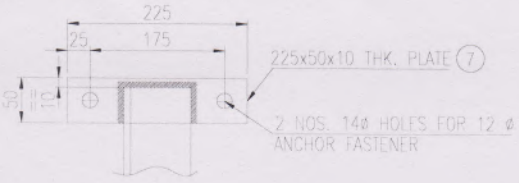
11.0 DOCUMENT ATTACHED:

1. Customer contract specification/ Section-11: TS-400kV XLPE POWER CABLES
2. Annexure-1: Typical cable arrangement in tunnel
3. Records of Notes of Meeting held on 20th May'2019 and 25th-26th Aug'2022 at THDCIL, Rishikesh on 420kV(Um) XLPE cables
4. Comments Resolution Sheet

ANNEXURE-1
PAGE 1 OF 2



DETAIL - A



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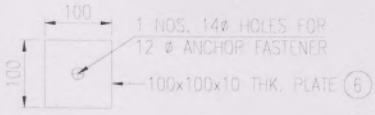

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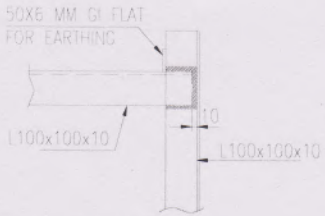

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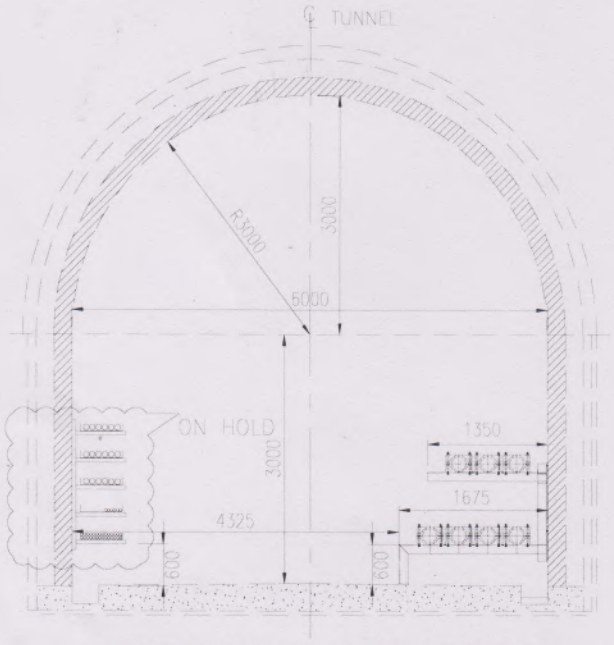
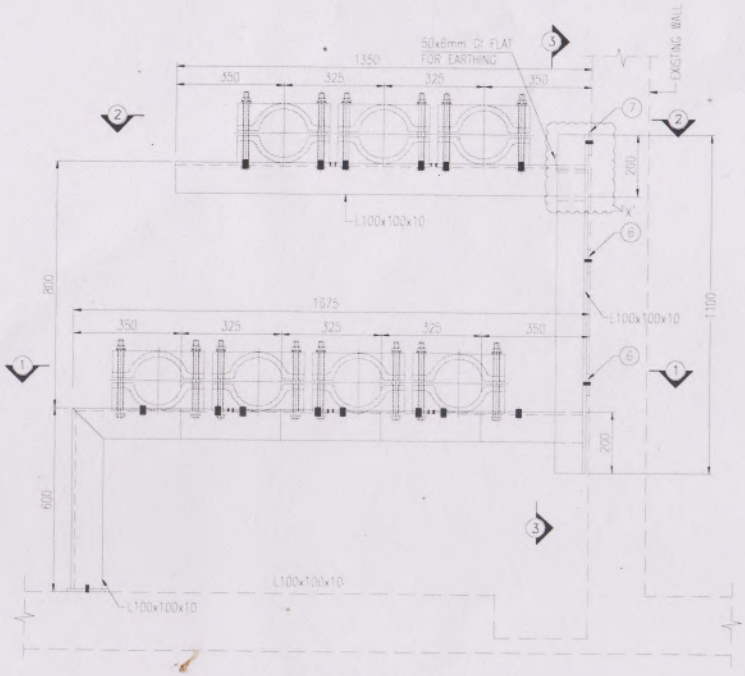


SECTIONAL VIEW OF 400KV CABLES
IN VENTILATION & CABLE TUNNEL

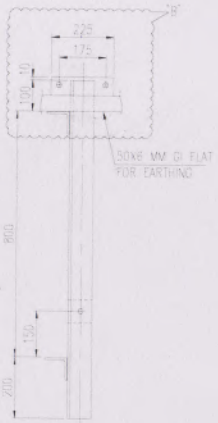
NOTES:-

1. ALL DIMENSIONS ARE IN MM.
2. CABLE SUPPORT RACK ARE TO BE FIXED IN TUNNEL WALL WITH ANCHOR FASTENER OF TENTATIVE SIZE 100MM.
3. THE SIDE WALL OF THE TUNNEL SHALL BE RCC AND FLUSHED FOR PROPER FIXING OF RACKS WITH ANCHOR FASTENER.

TYPICAL DETAILS FOR
400KV CABLE SUPPORT
IN TUNNEL

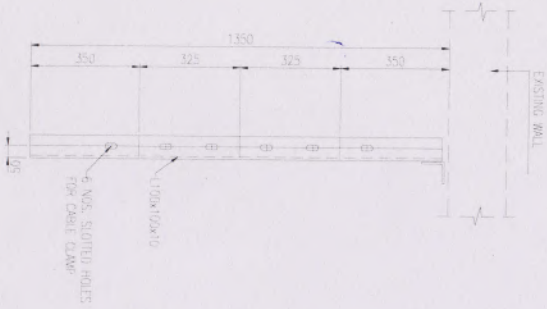


TYP. G.A DETAILS FOR
400KV CABLE SUPPORT IN TUNNEL @1.5M



VIEW 3-3

VIEW 1-1



VIEW 2-2

TYPICAL DETAILS FOR
400KV CABLE SUPPORT
IN TUNNEL

SECTION - 11

TECHNICAL SPECIFICATIONS FOR 400 kV XLPE CABLES AND ACCESSORIES

11.1 SCOPE

These specifications cover the technical requirement for the design, engineering, manufacture, testing at manufacturer's works before despatch, supply and services for insurance, transportation, delivery at project site in Uttarakhand, handling, storage and preservation at store / site including transport to place of installation, complete laying / erection & testing at site, commissioning and handing over of 400 kV single core conductor of 800 mm^2 copper equivalent cross sectional area, Cross Linked Polyethylene (XLPE) Insulated power cables and accessories. The accessories shall comprise of end terminations suitable for SF6 gas termination at one end & outdoor termination at other end, supporting structures & fixtures, cable trays alongwith all necessary supporting arrangement, cleats & plate spacers required for cable laying, Aluminium blocks to snake the cables properly, hardwares, earthing materials as required for complete earthing, embedments, etc. as broadly outlined in schedule of requirement under clause 11.29 of these specifications. If manufacturer feels that size of conductor required is different from that specified, then they can indicate the same. Any other item not explicitly mentioned herein / schedule of requirement but is necessary for completeness of works specified shall also be included in the scope. The cables & accessories shall be suitable for climatic conditions as detailed in Section-I, Volume-II of bidding documents.

The supplier shall provide all the material, labour, supervisory staff, plant, equipment and machinery and services necessary for accomplishing the work.

The scope of supply shall include all the mandatory spares as mentioned in clause 11.15.1 of these specifications. These mandatory spares are considered to be sufficient for normal operation of XLPE cables and accessories for 5 years. However, if the bidder feels that certain additional spares are required, he may give his recommendations separately in the price schedule and state the itemwise price. The mandatory / recommended spares shall be of the same material, dimensions, workmanship and finish as that of original. Also the shelf life of the spares shall be more or equivalent to the equipment offered.

The scope of supply shall include all the tools and tackles required for operation & maintenance of cables and accessories as mentioned in clause 11.14 of these specifications. However, all other tools, tackles, slings and testing instruments required for the laying, testing and commissioning of the cables at site shall be arranged by the supplier on lump sum hire basis. A complete list of handling, laying, erection & testing equipments / instruments / devices alongwith item wise hire charges shall be indicated in the price schedule.

The scope of work shall also include witnessing of tests and training of Purchaser's/ Consultant's engineers at the works of manufacturer as per clause 11.10 of these specifications.

11.2 SYSTEM DETAILS

The Vishnugad Pipalkoti H.E. Project envisages installation of 4 generating units each of 111 MW plus 10% continuous overload rating. The power generated by these units will be stepped up to 420 kV through 4 transformer banks each comprising of three single phase 46 MVA, 13.8/ 420/√3 kV generator transformers. The

generating units comprising of four sets of Francis turbines, generators, generator transformer, GIS and accessories are located in the underground power house cavern.

SF6 gas insulated switchgear (GIS) of double bus bar system shall be of 420kV, 2000 A, 40 kA short circuit rating and shall comprise of 7 bays i.e. four incoming bays from four 138 MVA transformer banks, 2 outgoing 400kV, 2000A feeder bays, and one bus coupler bay. The outgoing feeder bays of GIS shall have rating 2000A each and proposed to be connected to pothead yard equipment at El. 1150/1155 m (tentative) through 400 kV XLPE cables running inside the cable tunnel.

The preliminary layout & sections of the cable tunnel and cable end connections alongwith the general layouts of power house complex covered under the scope of these specifications have been indicated in Section-30: "Tender Drawings" of Part-2: Section VI: "Employer's Requirement". The bidder shall supply their proposed layout of laying of cables with the bid. The actual layout shall be finalised at the time of award of contract.

11.3 CODES AND STANDARDS

11.3.1 The design, material, manufacture, inspection, testing and performance of the XLPE cables and its accessories covered under the scope of these specifications shall be in accordance with the latest editions of the following IEC / IS and other publications:

1.	IEC 60060	High Voltage Test Techniques Part –1
2.	IEC 60187	General definitions and test requirements
3.	IEC 60068	Seismic test methods for equipment
4.	IEC 60137	Bushings for alternating voltage above 1000V (Outdoor bushing)

5.	IEC 60183	Guide to the selection of high voltage cables
6.	IEC 60228	Conductors of insulated cables.
7.	IEC 60229	Tests on cable over sheaths which have a special protective function and are applied by extrusion.
8.	IEC 60230	Impulse tests on cables and their accessories.
9.	IEC 60270	Partial discharge measurements.
10.	IEC 60287	Calculations of the continuous current rating of cables.
11.	IEC 60332 Part – I	Tests on electric cables under fire conditions – Test on a single vertical insulated wire or cable
12.	IEC 60376	Specifications & acceptance of new Sulphur Hexaflouride (SF6) Gas
13.	IEC 60506	Switching impulse test on EHV insulators
14.	IEC 60540	Test methods for insulations and sheaths of electric cables and cords.
15.	IEC 60811 Part–I (Sec-1)	Common test methods for insulating and sheathing materials of electric cables – Methods for general application – Measurement of thickness and overall dimensions – Tests for determining the mechanical properties.
16.	IEC 60811 Part-1 (Sec-2)	Common test methods for insulating and sheathing materials of electric cables – Methods for general application – Thermal ageing methods.
17.	IEC 60811 Part-1 (Sec-3)	Insulating and sheathing materials of electric cables- Common test methods – General application – Methods for determining the density – Water absorption test-Shrinkage test.

18.	IEC 60811 Part-1 (Sec-4)	Common test methods for insulating and sheathing materials of electric cables – Methods for general application – Tests at low temperature.
19.	IEC 60811 Part-2 (Sec-1)	Insulating and sheathing materials of electric and optical cables – Common test methods – Methods specific to elastomeric compounds – Ozone resistance, hot set and mineral oil immersion tests.
20.	IEC 60811 Part-3 (Sec-1)	Common test methods for insulating and sheathing materials of electric cables – Methods specific to PVC compounds – Pressure test at high temperature - Tests for resistance to cracking.
21.	IEC 60811 Part-3 (Sec-2)	Common test methods for insulating and sheathing materials of electric cables – Methods specific to PVC compounds – Loss of mass test – Thermal stability test.
22.	IEC 60811 Part-4 (Sec-1)	Common test methods for insulating and sheathing materials of electric cables – Methods specific to Polyethylene (PE) and polypropylene (PP) compounds – Resistance to environmental stress cracking – wrapping test after thermal ageing in air – Measurement of the melt flow index – Carbon black and / or mineral content measurement in PE.
23.	IEC 60859	Cable connections for gas insulated metal enclosed switchgear.
24.	IEC 60885 Part – 3	Electrical test methods for electric cables – Test methods for partial discharge measurements on lengths of extruded power cables.

25.	IEC 5831	PVC Compound.
26.	IEC 62067	Power cables with extruded insulation and their accessories for rated voltages above 150 kV (Um=170 kV) upto 500 kV (Um=550 kV) – Test methods and requirements
27.	IS 72	Galvanizing of steel structure.
28.	IS 1893	Criteria for earthquake resistant design of structures.
29.	IS 2062	Structural steel (standard quality).
30.	IS 2633	Methods for testing uniformity of coating in Zn-coated articles.
31.	IS 5561	Electric power connectors.
32.	ANSI / IEEE Std 80-1986	Guide for Electrical safety and sub-station grounding"

11.3.2 Cables and accessories meeting any other authoritative standard which ensures an equal or better quality than the standard mentioned above are also acceptable. The salient points of difference between the standards adopted and the standards mentioned in these specifications shall be highlighted clearly in the bid. The bidder is required to furnish the copies of all the applicable standards in English version alongwith the bid.

11.3.3 The Compliance of XLPE cables manufactured with the provisions of these specifications shall not relieve the manufacturer of his responsibility of furnishing cables of proper design, electrically and mechanically suited to meet the operating guarantees at the specified service conditions.

11.4 DRAWINGS

The drawings under the Drawing Volume of the bidding documents shall form an integral part of the specifications.

11.5 GENERAL DESIGN ASPECTS

The 400kV XLPE cables and its accessories shall be designed and manufactured in accordance with the most up-to-date experience for a system of this voltage level and shall incorporate the latest improvements of design and manufacture for the type of cables and accessories required. The workmanship shall be of highest quality and modern practice applicable for the manufacturing of 400 kV and above voltage class XLPE insulated cables.

11.5.1 Mechanical aspects

11.5.1.1 Design of XLPE cable systems shall be such that a life expectancy of minimum 35 years is achievable. The life of XLPE cable shall be substantiated by the bidder.

11.5.1.2 The XLPE insulated power cables for all the 2 outgoing circuits shall be installed in the same tunnel which is naturally ventilated and no forced ventilation cooling is envisaged.

11.5.1.3 Each XLPE insulated power cable of 800 mm^2 copper conductor cross sectional area shall be supplied in single suitable length. The exact length of each cable shall be finalised at the time of detailed design. The cable joints between the end terminals shall not be permitted.

11.5.1.4 Laying arrangement of XLPE power cables shall be such as to achieve optimum space saving, neat and logical arrangement. The routine inspections and possible repairs for all elements shall be accessible without removing support structures.

11.5.1.5 The XLPE insulated power cables shall be securely supported for the entire length with a suitable device to maintain continuous equal space between the cable supporting structures/ racks.

11.5.1.6 Cables shall be laid on continuous cable trays. The cables must be installed in a snaked shape to absorb the thermal expansion and contraction of the cables or suitable arrangements shall be proposed by the bidder for in the cable laying so as to compensate the thermal expansion and contraction for temperatures varying from 2.0 degree C to maximum operating temperature.

11.5.1.7 The ambient temperature at project site varies between a minimum of 2.0 deg C. to a maximum of 38 deg C. The relative humidity will vary from minimum of 35% to maximum of > 70%. These conditions alongwith the other climatic parameters as specified in Section-1 of Vol.-II of the bidding documents shall be taken into consideration while designing the cables and accessories. Altitude factor, where relevant shall be taken into consideration.

11.5.1.8 All the accessories shall be identical allowing for interchangeability within and between the accessories.

11.5.1.9 The cable system shall withstand the electro mechanical forces due to short circuit and earth fault currents including superimposed seismic forces.

11.5.1.10 All accessories of power cables shall be capable of withstanding the specified seismic forces.

11.5.1.11 Spare cable shall be laid in the tunnel and its outdoor termination end shall be installed at site and will be connected to the spare ACSR bare conductor bus provided in the pothead yard during erection. The indoor end of the spare cable shall also be connected with the SF6 indoor terminal. All the commissioning tests will be

performed on the spare cable also by connecting it to any one of the outgoing GIS feeder bays. However the GIS end terminal of the spare cable alongwith the assembled SF6 bushing shall be kept beyond the farthest end of outgoing GIS feeder bay in the GIS hall cavern so as to take this end to any of the GIS outgoing feeder bay connection whenever required.

11.5.2 Electrical Aspects

11.5.2.1 All lengths of XLPE cables and accessories shall be capable of continuous operation at the max. rated current without exceeding the max. conductor temperature as specified in the relevant IEC.

11.5.2.2 Thermal rating for all current carrying parts of the cable system shall be suitable for the normal rated current and for the rated symmetrical short circuit current of 40 kA for a duration of 1 sec. If the maximum short-circuit time be extended, the I*I*t value shall remain constant where I= Short circuit current in Ampere and t= duration of short circuit in secs.

11.5.2.3 The contours of energized metal parts of the XLPE power cable end terminals shall be such as to eliminate areas / points of high electrostatic flux concentrations. Surfaces shall be smooth with no projection or irregularities which may cause visible corona. No corona shall be visible in complete darkness when the accessories are subjected to the specified tests.

11.5.2.4 Metal cleats and spacers for the XLPE power cables and other metal parts which are subject to eddy current induced by the cable current, shall be of non magnetic material.

11.5.3 Seismic Design Criteria

11.5.3.1 The cable end terminals and supporting structures shall be designed

for operation in seismic zone for earthquake resistance. The seismic loads occur due to the horizontal and vertical accelerations which may be assumed to act non concurrently. The coefficients for horizontal acceleration as 0.38g and vertical acceleration as 0.19g shall be used for design purposes. The seismic loads shall be equal to static loads corresponding to the weight of the parts / accessories multiplied by the acceleration coefficients.

11.5.3.2 The supporting structures for XLPE cables and accessories shall be strong enough to withstand the forces in normal operation and in abnormal conditions with forces superimposed due to occurrence of earthquake. The copies of type test reports for similar type of cable accessories and structures, if tested earlier, shall be furnished alongwith the bid. If these type of cable accessories and structures have not been type tested earlier, design calculations by simulating the parameters shall be furnished alongwith the bid.

11.5.3.3 To prevent the movement of cable accessories during earthquake, suitable devices shall be provided for fixing the assemblies to the foundations. The bidder shall include necessary bolts and fittings for embedding in the concrete foundations in the scope of supply.

11.6 PERFORMANCE GUARANTEES, PENALTY FOR LOSSES & EVALUATION OF BIDS

11.6.1 The bidder shall guarantee that the goods to be supplied as per these specifications will be new, of most recent or current models and incorporates all recent improvements in design and material. The bidder shall further guarantee that the goods shall have no defect arising from design, materials, workmanship, installation or erection or from any act of omission of manufacturer that may develop under normal use in the conditions specified in these specifications as prevalent at site.

The bidder shall guarantee the following parameters of XLPE power cables and the same shall be verified at the manufacturer's works / site.

i) Power loss in conductor and in metallic sheath from indoor GIS termination upto outdoor termination per length of 400kV, XLPE insulated 800 mm^2 copper conductor cable while carrying continuous rated current.

ii) Dielectric power loss from indoor GIS termination upto outdoor termination per length of 400kV XLPE insulated, 800 mm^2 copper conductor cables, while carrying continuous rated current.

iii) The temperature rise for conductor and insulation / sheath while carrying continuously rated current.
   a) For conductor
   b) For cable insulation / sheath

iv) D.C. resistance of conductor at 20 deg C (firm value without tolerance.

v) Skin effect factor.

11.6.2 The total losses listed in the guaranteed and other technical particulars shall be the losses of each length of approximate 400 m or as required, of XLPE cable. The computation of losses shall be based on specified conductor, sheath and structures at maximum operating voltage and temperature for each cable length. The computation procedures and results shall also be submitted to the purchaser for reference.

11.6.3 The losses shall be indicated as firm. On testing, if it is found that actual losses are more than the values quoted, penalty will be recovered from the supplier at the rate of INR 3,80,000 (INR Three

Lakhs Eighty Thousand) per KW or its equivalent in bid currency for each kW of excess in losses.

11.6.4 The purchaser reserves the right to reject the cable if the losses exceed the declared losses beyond tolerable limits as specified or the temperature rise of cable exceeds the guaranteed values quoted by the bidder.

11.6.5 For purpose of comparison of bid, the quoted prices shall be enhanced by capitalisation for the cable losses as per Section-III "Evaluation & Qualification Criteria": Clause 1.2 (c) of Bidding Document. Loading for all the 7 lengths of XLPE insulated power cables will be considered for equalization. No change in the values of losses quoted in guaranteed & other technical particulars will be permitted after opening of bids and evaluation will be carried out on the basis of information furnished by the bidder.

11.6.6 For the purpose of evaluation of bids, the prices quoted by the bidders for delivery on project site & erection & commissioning for the quantity of XLPE cables and accessories as mentioned in schedule of requirement shall be considered. However, in case the quantity of XLPE cables and accessories increases or decreases at the time of execution of contract, the contract price shall be increased or decreased on pro-rate basis.

11.7 CONSTRUCTION & MATERIALS

11.7.1 High Voltage XLPE Power Cables

11.7.1.1 Conductor

Conductor shall consist of uncoated annealed copper wires in accordance with IEC-60228 or equivalent and the shape shall be compacted or segmented circular. The total cross-sectional equivalent area of copper conductor shall not be less than 800 mm^2. For segmented construction, if offered, each segment shall be

isolated with a separator tape(s) and cabled together with a semi-conducting binder tape (s). The conductor shall have smooth surface with no intermediate joint.

11.7.1.2 Conductor Shielding

Conductor shielding shall consist of extruded cross-linked semi-conducting compound applied over the conductor which shall be firmly bonded to the inner surface of the insulation layer. The semi conducting compound shall be free from any harmful size of void and protrusion which may deteriorate the cable's electrical performance for the specified voltage class. The protrusion from the conductor shield shall not be more than 80 micron and the maximum electric field stress intensity shall not be more than 16 kV / mm.

11.7.1.3 Insulation

Insulation shall consist of Extruded, dry cured and Nitrogen / Silicon oil cooled Cross-Linked Polyethylene (XLPE). The insulation shall be free from any harmful size of void and contaminant which may deteriorate the cable's electrical performance for the specified voltage class. The average thickness of insulation shall not be less than the nominal value guaranteed in the technical particulars. The minimum thickness of insulation at any point shall not be less than 95% of the guaranteed value. The contamination not larger than 60 micron is permissible in the raw material of XLPE insulation to be used for manufacturing and voids of not more than 20 micron shall be permitted during extruding of cables.

Thickness of the insulation shall be suitable to withstand following electrical stresses:

i) Max electrical stress shall be less than 27 kV /mm under AC

voltage test condition at 1.9 Uo for one hour.

ii) Electrical stress shall not exceed 75 kV/mm under impulse withstand test at 1425 KV peak. The thickness of insulation so worked out shall be submitted for the approval of purchaser during design stage.

iii) The above stresses have been indicated without considering the correction factor to these stresses. The supplier shall consider suitable correction co-efficient in respect of deterioration co-efficient, temperature co-efficient and safety factor for uncertainty, which shall be indicated during design for the consideration of purchaser.

11.7.1.4 Insulation Shielding

Insulation shielding shall consist of extruded cross-linked semi-conducting compound and shall firmly be bonded to the insulation. The semi-conducting compound shall be free from any harmful size of void and protrusion at the interface of the insulation. The protrusion for the shield shall not be larger than 80 micron. The maximum electric field stress shall not be more than 7 kV / mm.

11.7.1.5 Bedding

Bedding shall consist of cushion layer of a semi conducting tape(s) to absorb the thermal expansion and contraction of the extruded layers during operation, water barrier tape / swelling compound to form water protection barrier and a copper woven semi-conducting fabric tape(s) applied over the extruded semi-conducting insulation shielding with a suitable overlap.

11.7.1.6 Inner sheath

Cable inner sheath shall consist of extruded and corrugated

aluminum / laminated aluminum tape / lead in accordance with relevant IEC or equivalent standards. The average thickness of sheath shall not be less than the nominal value specified in guaranteed technical particulars. However the minimum thickness at any point shall not fall below 95% of the nominal value.

11.7.1.7 Outer Sheath

Outer sheath shall consist of extruded black and flame retardant PVC/PE compound in accordance with relevant standards. The average thickness shall not be less than the nominal value specified in the guaranteed technical particulars. However the minimum thickness at any point shall not be less than 95% of the specified value.

An outer co-extruded polymeric coating with conducting properties (long lasting coating such as graphite etc) shall be applied to the outer sheath as an electrode for the voltage test on the extruded PVC outer sheath.

11.7.1.8 Cable identification Marking

At least the following items shall be clearly marked at an interval of 1 m throughout the length of the cable by suitable means.

a) Rated voltage
b) Conductor size
c) Type of insulation
d) Manufacturer's name and /or trade name
e) Year of manufacture
f) Purchaser's name

11.7.1.9 Cable Identification Tags

In order to identify the phases and circuits, the identification tags

shall be provided at each end of the cable as well as at an interval of 100 m in the cable tunnel for each phase and circuit number.

11.7.2 Cable Accessories

11.7.2.1 Cable Termination / sealing ends

Outdoor termination / sealing ends shall be located in the pothead yard to connect with CT / overhead transmission lines emanating from the yard. The SF6 indoor termination / sealing ends shall be located inside of the underground GIS Hall to be directly connected with 420kV Gas Insulated Switchgears (GIS).

The spare cable termination shall be connected with spare ACSR bare conductor bus in pothead yard and GIS end shall be kept without connecting to GIS at the farthest end of GIS.

Each termination / sealing end shall be complete with all fittings, supporting structures, terminations, accessories etc. Besides, each sealing end shall be provided with consumable materials such as wiper and solvent for cleaning required during erection.

a) Outdoor Sealing End

The outdoor termination/ sealing end complete with all fittings, supporting structures and accessories shall be supplied and erected by the cable supplier. It shall be ensured that there is proper / suitable connection between the terminal connector and Potheadyard equipment. The successful bidder shall co-ordinate with the supplier(s) of outdoor 420 kV pothead yard equipments to complete the termination work.

The housing of the outdoor sealing end shall be porcelain /

epoxy resin of uniform quality and shall have sufficient strength against mechanical, electrical and thermal stresses.

The colour of porcelain / epoxy resin insulator shall be brown and the minimum creepage distance in millimeters per unit of the highest voltage shall be more than 25 mm / kV.

The outdoor sealing end shall be insulated from the supporting structures.

b) SF6 Indoor Termination / Sealing End

The housing of the SF6 indoor termination / sealing end shall be of porcelain / epoxy resin insulator type suitable for use with SF6 gas and shall have sufficient strength against mechanical, electrical and thermal stresses.

The XLPE cable supplier shall supply all the required fittings, supporting structures and accessories in order to connect the termination assembly of cables to gas insulated switchgear in isolated single phase arrangement. The cable termination shall be of SF6 indoor type.

The design and manufacturing of the termination assembly shall be done in accordance with IEC Pub. 60859 or equivalent standards. The successful bidder shall co-ordinate with the supplier of GIS to complete the termination work. The termination shall be so made that no force is transferred to GIS. The bidder shall furnish, in his bid, standard drawings showing details of indoor termination.

The cable termination sealing ends shall be suitably double earthed with the earth mat risers provided by the purchaser in the vicinity of the equipment.

11.7.2.2 Disconnecting link box (CCPU)

Disconnecting links shall be provided to both sealing ends to facilitate periodical checking of the integrity of the outer sheath.

The outdoor terminal end shall have suitable type of disconnecting link box known as Cable Covering Protective Unit (CCPU) to disconnect the earthing circuit during testing. The GIS side indoor terminal end shall have disconnecting link box (CCPU) for direct earthing with sheath voltage limiter.
The disconnecting link box shall be mounted on galvanised supporting steel structure and provided for each circuit individually. The protective device (sheath voltage limiter) shall be of non-linear resistor type and shall be made of zinc oxide compound.

The switch blade shall be made of copper. All pins and connections shall be weather proof. All link contacts shall be of copper or silver copper with special alloy tips. They shall be of self-adjusting type. The contacts shall be designed so that the pressure may not change with the normal wear during operation.

11.7.2.3 Bonding Cable

Bonding cable shall be used for earthing the metallic sheath of XLPE insulated power cables and as an earth continuity wire equalizing earth level between disconnecting links. Construction and materials of bonding cable shall comply with relevant IEC or equivalent standards and the cross-sectional area shall have enough size to withstand the specified short circuit rating i.e. 40 kA for 1 sec of the cable system.

11.7.2.4 Termination / Sealing End Supporting Structure

Supporting structure for outdoor termination / sealing end shall

consist of galvanized steel members. The supporting structure shall be supplied complete in all respect with necessary embedment, hardware, earthing material etc. The zinc coating shall be uniform, clean, smooth and free from spangle as possible. The zinc coating shall weigh not less than 0.61 Kg./m^2 over the area covered and not less than 0.09 mm in thickness. All galvanizing shall comply with the requirements of the relevant IEC/IS or ASTM Standards.

11.7.2.5 Cable Racks, Supports and Accessories

The XLPE cables from the GIS hall to pothead yard shall be laid on cable trays of galvanized steel. Vertical and horizontal supports of cable trays / racks shall consist of galvanized steel. The cable trays / racks & supports shall be supplied complete in all respects with necessary embedments, hard wares, cable spacers, aluminum blocks for snaking, earthing material etc. The cable trays & supports shall have sufficient strength to cater to the static & dynamic loads. The zinc coating shall be uniform, clean, smooth and free from spangle as possible. The zinc coating shall weigh not less than 0.61 Kg/m^2 over the area covered and not less than 0.09 mm in thickness. All galvanizing shall comply with the requirements of the relevant IEC/IS or ASTM Standards.

11.7.2.6 XLPE Cable Cleats

The rising portion of cables at both ends (bent portion) and the intermediate portion shall be clamped with single way aluminium cleats. The material of cleats shall be aluminium alloy in accordance with relevant IEC/IS or equivalent standards.

11.7.2.7 Foundations & Fixtures

If required, foundations of the equipments shall be prepared by

the purchaser on the basis of data supplied by the supplier. All block-outs, bracket supports, fixtures / inserts necessary for proper erection of embedded parts shall be supplied by the supplier

11.8 PAINTING

11.8.1 Before despatch the surfaces of all material to be painted shall be cleaned, filled, if necessary, and painted with suitable priming coat. The cable supporting system members which shall be inaccessible after installation and not to be galvanized shall also be finally painted at works before despatch. All other cable supporting members, which are not to be galvanized shall be finally painted at site by the contractor after installation. Necessary quantity of paint for this purpose shall be supplied by the contractor.

11.8.2 Painting shall be applied to clean surfaces free from dust, oil, moisture and other foreign materials. The details of equipments / members to be painted shall be supplied by the contractor.

11.8.3 Parts of equipment to be embedded in concrete shall not be painted.

11.8.4 The supplier shall apply one (1) coat of finish paint to the metal surface of equipment at site which is already painted with one (1) coat of finish paint and rust preventive paint at the manufacturer's works. The supplier shall also perform repair and finish coating of such parts of shop-coated equipment as damaged during transportation or installation work.

11.9 TECHNICAL REQUIREMENTS

11.9.1 The following criteria and ratings shall apply to the design and

manufacture of the XLPE insulated power cables and their accessories.

(i) Type of cable	400 kV, Single phase, single core, 800 mm^2 copper equivalent cross sectional area conductor, extruded cross-linked polyethylene (XLPE) insulated, & corrugated aluminium / laminated aluminium tape/ lead sheathed and PVC/PE outer sheathed power cable suitable for indoor / outdoor installation (natural air ventilated cable tunnel, underground GIS hall and pothead yard).
(ii) No. of Phases per circuit	3
(iii) Rated voltage, kV(rms)	400
(iv) Highest system voltage, kV(rms)	420
(v) Frequency, Hz	50±3%
(vi) Proposed maximum continuous current rating,A(rms)	1000
(vii)Rated Short circuit withstand current at a rated voltage for 1 sec. kA(rms)	Not less than 40 kA
(viii) Dynamic short circuit withstand current, kA (peak)	100kA
(ix) Rated Lightning impulse withstand voltage, kV (peak)	1425
(xi) Rated Switching impulse withstand voltage to earth, kV(peak)	1050

(xii) Rated One minute power frequency withstand voltage to earth, kV(rms)	630
(xiii) Limits of temperature rise for conductor, XLPE insulation and sheath.	As per IEC

(xiv) Insulation :

a) Material of insulation	Extruded Cross-linked polyethylene (XLPE)
b) Insulation screen / bedding	Extruded semiconducting compound semiconductor tape.
c) Metallic screen	Copper wires (woven fabric tape) with swelling compound / water barrier tape to form water protection barrier.

(xv) Conductor:

a) Material of Conductor	Copper
b) Copper equivalent Cross-sectional area (mm^2)	800
c) Shape stranded	Circular single / segmented circular
d) Conductor screen / bedding	Semi-conducting material/extruded layer of semi-conducting compound
e) Maximum resistance of conductor at 20^0C	0.0224 Ω/km

(xvi) Sheath:

a) Inner sheath (material)	Extruded corrugated aluminium/laminated aluminium tape or

b) Outer protective sheath	Poly-vinyl (material) (PE)	Chloride (PVC)/ Polyethylene
c) Type of metallic sheath earthing		
- GIS end		Solidly earthed through link box(CCPU) with SVL
- Pothead yard end		Solidly earthed through link box (CCPU) without SVL
(xvii) Ambient temperature		38
(xviii)Partial discharge level:		
a) For routine test		≤10pC at 1.5Un/√3=345kV
b) For type test		≤5p Cat1.5 Un /√3 = 345kV
(xix) Corona extinction voltage		Not exceeding 320 kV (rms)
(xx) Radio interference voltage (at 266kV rms)		Not exceeding 500 micro volts

xxi) Electrical stresses :

a) Maximum electrical stress Shall be less A.C. voltage test than 27kV/mm condition at 1.9Un/√3 for hour

b) Electrical stress under shall not withstand test at exceed 75kV/mm
1425kV peak.

(xxii) Operating Temperature of conductor

a) Maximum Temperature rise over ambient temperature of 38^{0}C	52^{0}C
b) Maximum permissible temp. during normal operation	90^{0}C
c) Maximum permissible temp.	100^{0}C

during overload
d) Maximum permissible temp. during short circuit 250^{0}C

(xxiii)Maximum electric stress during normal operation
a) On the internal semi conducting layer, 16 kV/ mm
b) On the outer semi-conducting layer 7 kV / mm

11.9.2 Route Profile and cable arrangement

i)	Cable route	It shall emanate from the GIS hall longitudinally from EL 1048 m through a tunnel at EL 1145/1150 m into a trench at 1150/1155 m in Pothead yard.
ii)	Route length	Horizontal distance between GIS hall and tunnel portal is about 250 m (to be finalised during design stage)
iii)	Height difference	107 m.approx.
iv)	No. of circuit	2 ckts of 400kV
v)	Cable laying arrangement	Flat arrangement in snake formation.
vi)	Cable fixing arrangement	Fixed with aluminium cleats or equivalent no magnetizing material

11.9.3 Auxiliary Supply Available

The purchaser shall make arrangement for providing auxiliary power supply at a convenient point required for erection, testing & commissioning of the EHV cables by the supplier. The power shall be made available at the following voltages

a) DC-220 V ± 10%
b) AC – 3 phase, 415 V ± 10%
c) AC-1 phase, 240 V ± 10%

11.10 INSPECTION & TESTS

Following tests shall be carried out by the supplier to demonstrate the performance of the items covered under these specifications to ensure the quality of material being supplied conform to relevant IEC / IS or equivalent international standards.

11.10.1 Routine Tests

Following routine tests shall be carried out on all finished cables and associated accessories before despatch at the manufacturer's works.

a) Check of dimensions
b) Conductor resistance test
c) AC high voltage test as per IEC 62067
d) Partial discharge test as per IEC 60885 (Part – 3)
e) Electrical Tests on over sheath as per IEC 60229

11.10.2 Sample Tests – As per IEC 62067

The following routine tests shall be conducted on samples of manufactured cables and on components of accessories in order to verify that the finished products meet the requirements of specifications. Test under item b) & g) shall be performed on complete lengths of cable.

a) Conductor examination
b) Measurement of electrical resistance of conductor
c) Measurement of thickness of insulation and over sheath
d) Measurement of thickness of metallic sheath

e) Hot set test for XLPE insulation
f) Measurement of capacitance
g) Lightning impulse voltage test followed by a power frequency voltage test
h) Water penetration test

11.10.3 Type Tests – as per IEC 62067

11.10.3.1 Type tests shall be conducted to demonstrate that the cables and accessories offered meet the requirement of specifications.

11.10.3.2 The complete type test certificates and data sheets for cables and accessories shall be furnished by the bidder alongwith the bid. If the tests conducted are not to the satisfaction of the Purchaser, the tests shall be reconducted by the supplier at his own expenses,

11.10.3.3 When the type tests have been successfully performed on one cable system of specific cross section, rated voltage and construction, the type approval may be accepted as valid for cable system within the scope of these specifications with reference to cross section, rated voltage and construction if the following conditions are met:

a) The voltage group is not higher than that of the tested cable system.
b) The conductor cross section is not larger than that of the tested cable.
c) The cable and the accessories have the same or a similar construction as that of the tested cable system.
d) Calculated maximum electrical stresses on the conductor and insulation screens, in the main insulation part(s) of the accessory and in boundaries are equal to or lower than for the tested cable and accessory.

11.10.4 Type Tests on High Voltage XLPE Power Cables & Accessories

a) Check on insulation thickness as per IEC 60811 (check of cable construction).
b) Tan δ measurement.
c) Partial discharge test after complete assembly of end terminations
   i) at ambient temperature
   ii) at high temperature (90^0C)
d) Cable bending test followed by installation accessories and partial discharge test at ambient temperature.
e) Switching impulse voltage withstand test as per IEC 60230 / 62067.
f) Lightning Impulse voltage withstand test followed by power frequency voltage test as per IEC 62067 / 60230.
g) Ageing treatment as per IEC 60811.
h) Tests for determining the mechanical properties of insulation and outer sheath before and after ageing
i) Heat cycle voltage test as per IEC 62067.
j) Flame retardant test on outer sheath.
k) Oil resistant test on outer sheath.
l) Measurement of hardness of outer sheath.
m) Abrasion test on outer sheath.
n) Insulation shrinkage test.
o) Measurement of resistivity of semiconducting screens as per IEC 62067.
p) Conditioning & mechanical test as per IEC 60811.
q) Loss of mass test on PVC over sheath.
r) Pressure test at low & high temperatures on over sheaths.

s) Heat shock test on over sheath.

t) Hot set test for XLPE insulation.

u) Measurement of carbon black contents in PE over sheath.

v) Water penetration test.

w) Annealing test (for copper)

11.10.5 Site Tests

Following tests shall be conducted after laying of cables and installation of accessories in accordance with relevant IEC or equivalent standards:

a) High voltage AC and DC withstand tests

b) Partial discharge measurement test

11.10.6 Test for Loss Measurement

Test to measure losses in conductor and insulation / metallic sheath of XLPE power cables of main run shall be carried out by supplier in the presence of purchaser's representative to prove that actual measured losses during testing at works / site are within guaranteed values specified in GTP. Bidder shall furnish methodology of carrying out loss measurement in his bid. If the actual losses during testing exceed the guaranteed values of losses, the supplier shall pay the penalty to the purchaser at the rates as indicated in these specifications.

11.10.7 Works / Shop Test Reports - As per IEC 62067

Supplier shall furnish to the purchaser six bound certified copies of report describing the complete shop tests. This report shall include, but not necessarily be limited to the following:

a) A brief write-up on the methodology of test and description of the test equipment with diagram showing arrangement of the test instruments and devices.

b) Sample computation, where necessary or desirable to show the test values employed in the equations.

c) Curves showing relation of tested quantities.

d) Data in tabulated form

e) Comparison of the test results with the valves indicated in guaranteed & other technical particulars of the specifications.

11.10.8 Final Acceptance Test as per IEC 62067

11.10.8.1 After site tests have been satisfactorily completed, supplier in presence of the purchaser shall conduct the final acceptance tests listed below to determine whether the supplied goods meet all the guarantees and requirements of these specifications.

a) 400 kV, XLPE insulated, single phase, single core, copper conductor of size 800 mm^2 power cables capable to carry continuous rated current complete with all appurtenances, shall be operated at continuous rating for 30 calendar days.

b) All shop tests included in the test report specified in clause 8.10.7 shall be deemed to be a part of the final acceptance tests. Certain routine tests may be repeated at the site, if in the opinion of the purchaser, they are necessary to establish the conformity of the items with the guarantees and the specifications.

c) A record of all performance tests shall be embodied in a test

report. Successful completion of the final acceptance tests shall be a condition precedent to final acceptance certificate in respect of the specified items.

11.10.8.2 Bidder shall furnish the detailed list of the testing equipments required at the site in the bid.

11.11 PACKING & SHIPMENT

11.11.1 Immediately after the completion of tests at works both ends of the cables shall be sealed with a pulling eye and a metal cap to prevent the ingress of moisture, dirt and insects. Each length of cable shall be bound on to a seaworthy robust steel / wooden drum with suitable battens.

11.11.2 Drums or parts of drums made from ferrous metals shall be treated with suitable rust preventive finish or coating to minimize rusting during transit or storage.

11.11.3 Indoor and outdoor cable accessories and other associated items shall be packed in robust wooden or suitable cases. Hygroscopic materials shall be duly protected from sea water or rain during transportation and storage.

11.11.4 The bonding cable shall be bound onto a wooden drum with wooden battens.

11.11.5 Shipping dimensions of cable drums shall be as large as practicable but within transport limitations as specified in Section – 1, Volume-II, of bidding document.

11.11.6 The drum shall be of such construction as to assure delivery of cable at site free from displacement and damage and should be able to withstand all stresses during handling in transit and laying. The cable drum shall be suitable for wheel mounting.

11.11.7 The bidder shall indicate the methods of storage of cable drums and accessories at site.

11.12 DRAWINGS, CATALOGUES AND MANUALS TO BE SUBMITTED WITH THE BID

11.12.1 Drawings & Manuals / Catalogues

Bidder shall submit alongwith his bid information general drawings describing and illustrating the items he proposes to offer, in such a manner as to make possible a complete understanding of the items on which bid is based. The information shall include all essential dimensions, types of material to be used in major parts with the chemical and physical properties of materials. The drawings and manuals / catalogues to be submitted alongwith the bid shall include following:

(i) Layout of the cables and accessories with relevant plans and cross sections covering following items.

(a) Main run from under ground GIS to outdoor pothead yard and interface arrangement at both ends.

(b) Cable trays / racks & associated Supporting structure, cable suspension devices, arrangement of cable cleats & blocks etc. in tunnel.

(c) Typical drawings of end terminations, bill of material and parts list or identifying sketch showing components.

(ii) Typical foundation Plan of cable supporting structure.

(iii) Drawing of cable drum.

(iv) Methodology for pulling / laying of cables upward / downward direction whichever is applicable.

(v) Typical drawing of CCPUs.

(vi) Typical drawing of cable bonding and grounding system

11.12.2 Design calculations

(i) Design calculations of 400kV XLPE insulated power cables (conductor & sheath) to withstand short circuit current for 1 sec.

(ii) Design calculations for thermal withstanding capacity for short circuit current (conductor & sheath).

iii) Typical Graph showing the voltage gradient along the radii of conductor and insulation for 1000 A continuous current at different power factor between 0.9 (over-excited) to 0.9 (under excited).

iv) Calculation indicating that the 800 mm^2 copper (equivalent) conductor single phase 400 kV XLPE insulated power cable is capable to carry 1000 A continuous current

11.13 DRAWINGS, MANUALS & DESIGN CALCULATIONS TO BE SUBMITTED FOR APPROVAL AFTER AWARD OF CONTRACT

11.13.1 Drawings

The manufacturer shall submit to the purchaser following drawings after the award of contract expeditiously in a sequential manner.

(i) Dimensional and layout arrangement of 400kV XLPE power cables and accessories in GIS hall, cable Tunnel & Pothead

yard including drawing of danger/caution plate.

(ii) Assembly drawings showing plan, elevation, section & details for cable support system & termination ends.

(iii) Detailed drawings showing arrangement for fixing of cables in trays / racks, embedment of cable suspension devices, cable cleats blocks for snaking, support structure etc. in Cable tunnel, GIS hall & Pothead yard.

(iv) Detailed drawings for sealing end support structure.

(v) Bill of material and parts list or identifying sketch showing components.

(vi) Foundation plan and loading for cable supports and end terminations.

(vii) Drawings and part numbers of items of spares.

(viii) Drawing & technical details of end terminations.

(ix) Detailed drawing for disconnecting link boxes with and without SVL.

(x) Detailed drawing for grounding system

(xi) Any other drawing, literature, documents not specifically listed but are considered essential.

(xii) Detailed drawing of cable drum.

(xiii) Calculations for each lengths of cables.

(xiv) Detailed drawing showing methodology for pulling / laying of cables.

11.13.2 Instruction Manuals

The supplier shall prepare manuals covering the information and instructions pertaining to the following sections for

guidance during storage, installation and operation & maintenance.

i) **Manual for storage, preservation and handling**

This shall contain detailed information as to the system of marking adopted to show sling points, restrictions as to position of transport of any package & position of application of any cradles provided for use during transport or site storage of any item, restrictive instructions and the form in which such instructions are inscribed on the package. Detailed instructions for site storage & preservation of goods shall also be furnished.

ii) **Manuals for erection, dismantling, testing and commissioning**

This section shall include full and detailed instructions regarding the procedures and precautions to be observed during erection / laying of cables, accessories, etc including the use of erection equipment. It shall also include the proformas required to be filled during erection to demonstrate that the equipment erected is within the tolerances specified in the contract.

The testing and commissioning section shall include full detailed directions for the methods & procedures to be followed, the quantities to be observed & recorded in checking the accuracy of erection and carrying out site tests as required under the contract. It shall also include

the proformas required to be filled for site tests, description of all equipment & instrument provided for these tests and of their use.

iii) **Manual for operation & maintenance**

This shall include complete instruction for the operation and maintenance of the equipment not only during the defect liability period but more particularly during its operating life. The directions shall be set out simply, clearly and systematically. In particular, this section shall include instructions for all the "Dos" and "Don'ts", full list of routine checks and their timing, directions as to fault finding and recommendations for the observation which should be recorded.

11.13.3 Design calculations

Within two months after award of contract, following design calculations shall be furnished for purchaser's approval :

1. Insulation dimensions including thickness of inner / outer sheath and semi-conducting layers.
2. Verification of thermal withstand capacity of XLPE cables for short circuit current.
3. Conductor, conductor sheath, insulation and structure losses.
4. Temperature rise.
5. Cooling and anti-condensation behavior.
6. Voltage gradient calculations for operating voltage, highest system voltage and for transient voltage.

7. Supporting steel structure design and calculations.
8. Mechanical forces and stresses induced in cable conductor and metallic sheath to prove the mechanical strength.

11.14 TOOLS, TACKLES AND EQUIPMENTS REQUIRED FOR ERECTION, TESTING AND COMMISSIONING, OPERATION AND MAINTENANCE

All special tools, tackles, slings, testing instrument etc required for handling, pulling, laying , installation, testing and commissioning of the XLPE insulated power cables and accessories shall be arranged by the manufacturer on lump sum hire charges. In addition manufacturer shall supply two sets of hand tools alongwith racks for holding them in new and unused condition to be used only for the maintenance of the cables and accessories during its useful life. A list of such maintenance tools & tackles shall be separately given in the Annexure-2. Erection, testing and commissioning tools/tackles and testing instruments shall include but not limited to the following:

a) Special tools required for laying, hauling, installation and dismantling of the XLPE insulated power cables and its accessories.

b) The HV AC / DC testing kit and partial discharge measurement equipment for field tests.

c) Any additional requirement of erection tools, testing instrument etc for erection, testing and commissioning shall be met by the supplier without any extra cost to the purchaser.

11.15 SPARE PARTS

11.15.1 Mandatory spares

The bidder shall supply the following mandatory spares considered necessary for first five years of normal operation of XLPE insulated power cables and accessories covered under these specifications and shall quote unitwise / itemised prices for the same.

(i) Outdoor termination / sealing end complete with all accessories. 2 Nos.

(ii) SF6 indoor termination / sealing end complete with all accessories. 2 Nos.

(iii) Disconnecting links (Earthing link boxes)

(a) With Sheath Voltage Limiter 2 Nos.

(b) Without Sheath Voltage Limiter 2 Nos.

(iv) Bonding cable 100 m.

11.15.2 Additional spares (optional)

11.15.2.1 One cable jointing kit shall be included as optional items. The bidder is required to furnish the complete technical details for prefabricated straight through joint. The time required for making / installing the joint at site shall also be indicated in the bid. The price quoted for this item shall not be considered for bid evaluation. However, the purchaser will decide whether this optional item is to be purchased or not at later date.

11.15.2.2 Additional optional spare parts over and above the optional spare indicated above under clause 11.15.2.1, the bidder may consider necessary for five years of normal operation and maintenance for these cables and accessories may quote

separately in the price schedule. However, these will not be considered for evaluation of bid.

11.16 COMPLETENESS OF THE SPECIFICATION ITEMS

Any fittings, accessories or apparatus required for successful commissioning of XLPE cables though may not have been specifically mentioned in the specification but are usually necessary for the completeness of the equipment shall be deemed to be included in the specifications and shall be indicated and supplied by the supplier.

11.17 GUARANTEED & OTHER TECHNICAL PARTICULARS

Guaranteed and other technical particulars shall be furnished alongwith the bid as per Annexure-1. In the absence of the requisite data, it may not be possible to evaluate the suitability and adequacy of the XLPE insulated cables alongwith the accessories and bid lacking in this respect shall be rejected. Particulars subject to guarantee shall be clearly marked. Any additional information not covered in the Annexure-1 but considered necessary by the bidder shall be given separately.

11.18 SCHEDULE OF REQUIREMENTS

The estimated schedule of quantities/lengths of extruded Cross-Linked Polyethylene (XLPE) insulated, corrugated aluminium / laminated aluminium tape / lead sheathed and PVC / PE outer sheathed power cables and their accessories which are to be supplied under these specifications are as under:

(i)	400 kV, XLPE insulated, Single phase, single core, of copper (equivalent) conductor of 800 mm^2 cross-sectional area power cables	280mts.(tentative) (as required) 7 pieces each 400 M (approx.) length including one spare)
(ii)	400 kV, Indoor type, SF6 termination / sealing Ends	7 Nos.
(iii)	400 kV, Outdoor type Termination / sealing ends	7 Nos.
(iv)	Disconnecting links or Earthing devices (CCPU)	
	a) with SVL	2 Nos.
	b) without SVL	2 Nos.
(v)	Bonding Cable	800 m approx. (as required)
vi)	Galvanized cable trays / racks alongwith their supports, single way cable cleats, aluminium blocks for cable snaking, cable spacers, cable suspension devices, embedments, hardwires, etc.	1 Lot (as required)
vii)	Galvanized steel support structures complete with foundation embedments, hardware fittings as required for cable termination / sealing ends	1 Lot (as required)
viii)	Suitable earthing materials complete with earthing terminals, bi-metallic clamps, washers, lugs, pads, hardware etc. for complete system to be connected to the ground mat risers provided by the purchaser	1 Lot (as required)
ix)	Mandatory spares required for 5	1 Lot

	years of normal operation as specified under clause 11.15 of the specifications	
x)	Special tools, tackles, erection devices etc. required for normal operation, testing, commissioning and maintenance of items covered under these specifications as per clause 11.14 of the specification	1 Lot
xi)	Any other fittings, accessories, apparatus / items which may not have been specifically mentioned in the bidding documents but are required for the installation / satisfactory operation of the goods (Detailed list of such items shall be mentioned by the bidder)	1 Lot (as required)

ANNEXURE-1

SCHEDULE OF GUARANTEED & OTHER TECHNICAL PARTICULARS

A. 400 kV XLPE Insulated Power Cables.

1. Manufacturer's name & country of origin
2. Standard according to which Cable is manufactured and tested
3. Type
4. No. of phases per circuit
5. No. of cables per phase
6. No. of core per cable
7. Rated voltage*
8. Highest system voltage*
9. Rated continuous current*
10. Rated short-time withstand current for 1 sec.*
    a) for conductor
    b) for metallic sheath
11. Electrical Stresses (A.C. Voltage) Short circuit forces*
    a) On conductor
       i) Average
       ii) Maximum

    b) On Inner Semi-conductor layer
       i) Average
       ii) Maximum

    c) On outer semi-conductor layer
       i) Average
       ii) Maximum
12. Rated frequency (Hz)
13. Insulation level*

    (a) One Minute Power Frequency withstand voltage kV(rms)

    (b) 1.2/50 micro second lightning impulse withstand voltage(kV)peak

    (c) 250/2500 micro second switching impulse withstand voltage kV(peak)
14. Temperatures*

a) Max. Temperature rise over ambient temperature of 38 deg C.

b) Maximum permissible operating conductor temperature

c) Maximum permissible conductor temp. during short circuit

d) Heating time constant when cable is switched on

i) From zero load (cold condition) to a load of continuous current and corresponding conductor temperature.

ii)From zero load (cold condition) to a load of maximum continuous current

(offered by bidder) to attain 90 ^{0}C temperature, keeping the load constant.

15. Power Losses*

a)	Guaranteed power loss in conductor in each length of 400 m approx. or as required (without tolerance) conductor temperature of 90^o C.	(Watts)
b)	Guaranteed Dielectic power loss in each length of 400 m approx. or as required (without tolerance) conductor temperature of 90^o C.	(Watts)
c)	Guaranteed power loss in metallic sheath for each length of 400 m approx. or as required (without tolerance)at conductor temperature 90^o C	(Watts)
d)	Guaranteed total power losses in each length of 400 m approx. or as required (without tolerance) conductor temperature of 90^o C (a+b+c)	(Watts)
e)	Max. permissible iron losses in supporting structures	(KW)

16. Maximum total power losses per metre at conductor temperature of 90 deg C (Watts)

17. Conductor details

(a) Type

(b) Material and shape

(c) Material Cross-sectional area (mm^2)

(d) Conductor diameter (mm)

(e) Weight of conductor (kg/m)

(f) Current density in conductor (A/mm^2)

(g) Conductivity of conductor (mho)

(h) Ultimate tensile strength of conductor

(i) Max. short-circuit current rating & duration KA/sec.

(j) Impedance of conductor per meter ohm

18. Conductor shielding

a) Material -
b) Thickness mm
c) Max. size of protrusion µm
d) Electric stress level kV/mm
i) Maximum
ii) Average

19. Insulation details

a) Material
b) Thickness mm
c) Relative permittivity -
d) Min. resistivity Ω-cm
e) Max. moisture content ppm
f) Max. size of void µm
g) Max. size of contaminant (Black metal and coloured impurity) µm

h) Dielectric loss angle (at rated voltages at 20^0C & 90^0C)	-
i) Outer dia of insulation	mm

20. Insulation shielding

a) Material	-
b) Thickness	mm
c) Max. size of protrusion	μm
d) Electric stress level	kV /mm

21. Bedding (cushion layer)

a) Material	-
b) Total thickness	mm

22. Inner sheath

a) Material	-
b) Type	-
c) Thickness	mm
d) Maximum short circuit current rating & duration	kA/sec.
e) Sheath induced voltage	V
f) Type of earthing	
g) Metallic sheath outer dia	mm
h) Mutual inductance between conductor and sheath.	

23. Outer sheath

a) Material	-
b) Type	-
c) Thickness	mm
d) Colour	-
e) Oxygen index	-
f) Carbon black contents for PE	

24. Cable outside diameter	(mm)
25. Cable weight	(Kg/m)
26. Inductive reactance per phase per meter at 20^0 C.	(ohms)
27. Capacitance per phase per meter at	(Micro Farad)

20 deg C & 50 Hz

28.	Effective AC resistance per phase per metre	(ohms)
29.	Surge impedance	(Ω)
30.	DC resistance at 20 deg C	(ohms)
31.	Max. safe continuous current at ambient temperatures varying from 2.0^0 C to 38^oC	A
32.	Charging current & power	
	a) Maximum charging current per phase	(A/km)
	b) Maximum charging current per circuit	(A/km)
	c) Maximum charging power per circuit	(kVA/km)
33.	Cable insulation resistance	MΩ
34.	Cable burn through time at rated short circuit current	(sec)
35.	Corona Extinction voltage	kV
36.	Radio interference at 266 kV (rms)	micro volts
37.	Protrusion	(Micron)
	a) Conductor shielding b) Insulation shielding	
38.	Cable test particulars	
	a) AC high voltage test	kV/min.
	b) AC high voltage long time withstand test	kV/Min.
	c) Impulse voltage withstand test	kV(Peak)
	d) Partial discharge test	kV/pC
	e) Voltage test on outer sheath	kV/Min.
	f) Impulse voltage test on outer sheath	kV(Peak)

g)	Max. Pulling tension	Kg.
h)	Max. permissible side wall pressure	Kg/m.
i)	Min. bending radius	m.
j)	Max. symmetrical short circuit current	kA/sec.
k)	Max. phase to earth short circuit Current	kA/Sec.
l)	Current carrying capacity at 30^0C,50^0C,90^0C	
	i) In flat formation	A
	ii) In trefoil formation	A
	m) Whether the cable is tested for pre qualifying tests as per IEC 62067	

B **400 kV Cable Accessories**

1. Outdoor termination

a)	Name and country of manufacturer	-
b)	Type	-
c)	Insulating medium	-
d)	Type of interface	-
e)	Material and colour of the bushing	-
f)	Bushing particulars	
	• Make	
	• Type	
	• Voltage class	
	• 1 minute power frequency withstand voltage	kVrms
	• Lightning impulse withstand voltage	kVpeak

- Switching impulse withstand voltage kVpeak
- Flash over values
  - Dry kV
  - Wet kV
- Puncture values kV
- Creepage distance (mm)
- Compression strength kg/cm^2
- Cantilever strength kg-m
- Pressure differential withstand capacity of conical insulators -

g) Is terminal type tested, if yes, to which standard? -

h) Overall dimensions of termination mm

i) Connecting clamps
   i) Current rating kA
   ii) Overall dimensions kA

2. Indoor Termination

a) Name and country of Manufacturer -

b) Type -

c) Insulation medium -

d) Type of interface -

e) Is terminal type tested, if yes, to which standard?

f) Overall dimensions mm

g) Overall weight Kg

3. a) Disconnecting Link

i) Material and size

ii) Continuous current rating A

iii) Momentary current rating kA

b) Earthing Devices

(i) Earthing conductor

- Material & size
- Continuous current rating A
- Momentary current rating kA

(ii) CCPU Cubicle / link box

- Material
- Size & weight
- Protection code

(iii) Technical particulars of LA (SVL)

- Type
- Rated voltage kV
- Voltage limiting range
- Fault current rating for 1 sec. kA
- Lightning impulse voltage withstand capacity kV(peak)
- Power frequency withstand voltage kv(rms)
- Momentary current rating kA
- Continuous current rating A

4. Cable drums

a) Flange diameter mm

b) Drum diameter & width mm

c) Drum weight Kg.

d) Drum material

e) Spindle hole dia mm

5. Supporting Structures:

a) Cable supporting trays/racks & structures

i) manufacturer's name
ii) Material
iii) Whether magnetic or non-magnetic type
iv) Minimum yield point
v) Total weight of the cable trays / racks kg/m
vi) Maximum span between the supports
vii) Max. temperature rise under steady state condition at maximum continuous rated current ^{0}C
viii) Max. potential rise in the event of short-circuit V

b) Terminal End Supporting Structure

i) Material / composition of material

ii) Reference standard

iii) Min. guaranteed yield point

iv) Ultimate tensile strength

v) Base dimensions
vi) Weight & size of each member of supporting structures kg

c) Cleats, Clamps, Bolts and Nuts

i) Material/composition of material

ii) Min. tensile strength of bolts kg/cm

iii)Proof load at nuts kg

6. Test Particulars For Cable Accessories

i)	AC high voltage long time withstand test	kV/Min.
ii)	Impulse voltage withstand test	kV (peak)
iii)	Partial discharge test	kV/pC
iv)	Min. creepage distance of porcelain / Epoxy resin bushing	mm/kV
v)	Max. permissible pressure of oil/SF6 (if applicable) in outdoor termination	kg/mm^2
vi)	Design pressure of oil or SF6 (if applicable) for outdoor termination	kg/mm^2
vii)	Max. permissible pressure of SF6 gas or oil (if applicable) in indoor type termination	kg/mm^2
viii)	Design pressure of SF6 gas or oil (if applicable) in indoor type termination	kg/mm^2
ix)	Permissible tension for outdoor termination	kg/mm^2
x)	Permissible tension for indoor termination	kg/mm^2

7. Bonding Cable

i) Material

ii) Size

iii) Type of bonding

iv) Current carrying capacity

C. Other Information

1. Details of interfaces

a) Max. forces at interface
- Tensile
- Compressive

b) Tolerance on positioning of flanges

c) Earthing arrangement

2. Min. recommended clearance mm
a) Between the cable
b)Between the racks (vertical)

3. Details of cable end sealing, cable clamping arrangement etc.

4. Details of cable handling, laying and pulling Device

5. Weight and dimensions of shipping packages
(a) Name and shipping weight of the heaviest package of cable drums etc. (kg)

(b) Name and dimensions (LxBxH) of the largest package

(c) Shipping weight of all special cable laying, handling devices, wrenches and tools etc (kg)

(d) Shipping wt. and dimensions of each XLPE Cable end termination.

(e) Max. length of 400 kV, single phase, single core of 800mm^2 copper conductor XLPE insulated power cable which can be supplied in single length. (m)

(f) Standard length (m)

6. Design life of cable (Yrs)

7. Cable loading

a) Continuous over loading at one go
b) Total hours of emergency to which cable can be loaded during its life.

8. Any other item/information not covered above.

Note"*" Marked against items means guaranteed values.

ANNEXURE-2

SCHEDULE OF SPECIAL TOOLS, TACKLES, SLINGS AND HANDLING EQUIPMENTS REQUIRED FOR ERECTION, TESTING AND COMMISSIONING.

Sl. No.	Items Purpose	Qty

Contents

SECTION 3: 3

PROJECT DETAILS & GENERAL TECHNICAL REQUIREMENTS (FOR ALL EQUIPMENT UNDER PROJECT) 3

1. GENERAL 3
2. PROJECT INFORMATION AND SYSTEM PARAMETERS 3
3. GENERAL TECHNICAL REQUIREMENTS 5

i. Type Tests 5

ii. Codes and Standards 5

4. MATERIAL/ WORKMANSHIP 6

i. General Requirement 6

ii. Provisions for Exposure to Hot and Humid climate 8

5. COLOUR SCHEME AND CODES FOR PIPE SERVICE/ PANELS 8
6. PROTECTION 9
7. FUNGI-STATIC VARNISH 9
8. SURFACE FINISH 9
9. GALVANIZING 10
10. TRANSPORT AND PACKING 10

i. Packing 10

ii. Packing and Marking 10

iii. Shipping marks 12

iv. Packing lists 12

11. HANDLING, STORING AND INSTALLATION 12
12. DEGREE OF PROTECTION 13
13. RATING PLATES, NAME PLATES AND LABELS 13
14. EARTHING 14
15. TERMINAL BLOCKS AND WIRING 14

i. Wiring 14

ii. Terminal blocks 15

16. ELECTRICAL EQUIPMENT ENCLOSURE 15

i. General 15

ii. Construction requirements 16

17. SPACE HEATERS 17

18. QUALITY 17

19. DOCUMENTATION 20

i. List of Documents 20

ii. Drawings 21

iii. Approval Procedure 21

iv. Documents to be Submitted along with Offer 22

v. Documentation Schedule 22

20. ELECTRICAL MEASUREMENTS 23

SECTION 3:
PROJECT DETAILS & GENERAL TECHNICAL REQUIREMENTS
(FOR ALL EQUIPMENT UNDER PROJECT)

1. GENERAL

1. This section stipulates the General Technical Requirements under the Contract and will form an integral part of the Technical Specification.
2. The provisions under this section are intended to supplement general requirements for the materials, equipment's and services covered under other respective sections and are not exclusive. However, in case of conflict between the requirements specified in this section and requirements specified under other sections, the requirements specified under respective sections shall hold good.

2. PROJECT INFORMATION AND SYSTEM PARAMETERS

Project information and System parameters shall be as follows,

A.	**Project Information**	
a)	Customer/ Purchaser/ Owner	THDC India Ltd., Rishikesh, Uttarakhand
b)	Consultant/ THDCIL	SMEC
c)	Project Title	Vishnugad Pipalkoti Hydro Electric Project (4X111MW)
d)	Location	The Vishnugad Pipalkoti Hydro Electric Project (4 x 111 MW) is located on Alaknanda River, a major tributary of river Ganga, in district Chamoli in the state of Uttarakhand.
e)	Transport Facilities	The nearest railhead is Rishikesh (225 Km) and the nearest Airport is Jolly Grant, Dehradun (240 Km). The project is approachable by an all-weather road (National Highway No. 58).
f)	Postal Address	It shall be provided separately
B.	**Site Conditions**	
a)	Maximum ambient Temperature	40^0C
b)	Minimum ambient Temperature	-7^0C

c)	Design ambient temperature for electrical equipment design	40^0C
d)	Relative humidity	100%
e)	Pollution Severity	Heavily Polluted
f)	Seismic zone	IV
g)	Seismic Coefficient	0.38g (In horizontal direction), 0.19g (In vertical direction) for design purpose
h)	Basic Wind speed	39m/sec
i)	Maximum rainfall	293.3mm in 24 hours
C. System Parameters and Clearances (At EL 1000)		
i)	Nominal system Voltage	400kV
ii)	Highest system voltage	440kV
iii)	Rated short time current	40kA for 1 sec
iv)	Frequency	50Hz±3 %
v)	Normal Current	2000A
vi)	Lightning impulse withstand voltage	1425kVp
vii)	Switching Impulse voltage	1050kVp
viii)	Power frequency withstand Voltage	630kVrms
ix)	Minimum creepage Distance	25mm/kV
x)	System earthing	Solidly earthed
xi)	Phase to phase Clearance	4200mm
xii)	Phase to Earth Clearance	3500mm
xiii)	Sectional Clearance	6500mm
D. Auxiliary Power Supply		

i)	3 phase A.C power supply	415V ± 10%, 50 Hz ± 3%, 3-phase 4 wire, solidly earthed , Frequency variation under extreme condition ± 5%
ii)	1 phase A.C power supply	240V ± 10%, 50 Hz ± 3%, 1-phase , 2 wire , AC supply , Frequency variation under extreme condition ± 5%
iii)	D.C. power supply	220V + 20% to -25%, 2-wire ungrounded 48V + 20% to -25% , 2 wire system positively earthed
iv)	Combined variation of voltage ± 10%, and frequency ± 5%,	

3. GENERAL TECHNICAL REQUIREMENTS

i. Type Tests

All equipment/systems to be supplied shall conform to type tests as per relevant standards and proven type. The Bidder / vendor shall furnish the reports of all the type tests carried out within last ten years from the date of signing of contract (i.e. 18.11.2014) as listed in relevant clauses in respective electrical specification and relevant standards for all components / equipment / systems. These reports should be for the tests conducted on identical/ similar components /equipment/systems to those offered / proposed to be supplied under this contract.

Type tests done in an independent government laboratory or in the presence of representative of State Electricity Board or other reputed public undertakings, the type test reports of the same shall be submitted for scrutiny /approval. If these are found suitable and technically acceptable, conducting of type tests shall be waived off.

In case Vendor is not able to submit report of type test(s) conducted in last ten years, or in case type test report(s) are not found to be meeting the specification/relevant standard requirements, then all such tests shall be conducted under this contract by the Bidder free of cost to Employer/Purchaser, and reports shall be submitted for approval. No charges shall be paid under this contract. All acceptance and routine tests as per relevant standards and specification shall be deemed to be included in the bid price.

ii. Codes and Standards

All materials and equipment shall generally comply in all respect with the latest edition of relevant international electro-technical commission (IEC) or any other internationally accepted standard which ensure equal or better quality or relevant Indian standard(IS) mentioned against each equipment and this specification. Other International/National standard such as DIN, VDI, BS etc. shall be accepted for only material codes and manufacturing standards, subject to the employer's approval.

ASTM (American Society for Testing Materials), AISI (American Iron and Steel Institute), DIN (German Industrial Standards) and BSI (British Standards) are approved standards for the supply of Materials.

Material tests according to DIN 50049-3.1 C shall be provided for all important parts of the equipment such as: steel plates for parts under hydraulic pressure, all major castings (runner, shutoff valve, etc.), large forgings (turbine and generator shaft etc.), high stressed large bolts etc.

For less important parts, certificates according to DIN 50049-2.3 are acceptable.

Materials shall be new and of first-class quality, suitable for the purpose, free from defects and imperfections, and the classifications and grades in conformance with the latest issue of the respective ASTM, AISI, DIN or BS standard. Material to other standards may be used if approval by the Owner has been obtained. Material specifications, including grade or class data, shall be shown on the appropriate detail drawings submitted for review.

The vendor shall indicate in the Technical Data Schedules, the materials and applicable standards for all major parts of the supply.

The materials shall be carefully selected for the intended purpose and due consideration of the site conditions and the tropical environment. Higher grade material shall be used where ordinary material is insufficient.

"Not withstanding reference made to various standards all equipment and works as per provisions and requirements of relevant and latest Indian Standards shall be acceptable".

In the event of any conflict between the codes and standards referred to in the above clauses and the requirement of this specification, the requirement of Technical Specification shall govern.

The international SI-system of units shall be used for documents, calculations, correspondence, drawings etc.

4. MATERIAL/ WORKMANSHIP

i. General Requirement

Where the specification does not contain characteristics with reference to workmanship, equipment, materials and components of the covered Equipment it is understood that the same must be new, of highest grade of the best quality of their kind conforming to best engineering practice and suitable for the purpose for which they are intended.

The design of the Works shall be such that installation, future expansions, replacements and general maintenance may be undertaken with a minimum of time and expenses. Each component shall be designed to be consistent with its duty and suitable factors of safety, subject to mutual agreements and shall be used throughout the design. All joints and fastenings shall be devised, constructed and documented so that the component parts

shall be accurately positioned and restrained to fulfil their required function. In general screw threads shall be standard metric threads. The use of other thread forms will only be permitted when prior approval has been obtained from purchaser.

Whenever possible, all similar part of the Works shall be made to gauge and shall also be made interchangeable with similar parts. All spare parts shall be interchangeable with, and shall be made of the same materials and workmanship as the corresponding parts of the Equipment supplied under the Specification. Where feasible, common component units shall be employed in different pieces of equipment in order to minimize spare parts stocking requirements. All equipment of the same type and rating shall be physically and electrically interchangeable.

All materials and equipment shall be installed in strict accordance with the manufacturer's recommendation(s). Only first-class work in accordance with the best modern practices will be accepted. Installation shall be constructed as being the erection of equipment at its permanent location. This, unless otherwise specified, shall include unpacking, cleaning and lifting into position, grouting, levelling, aligning, coupling of or bolting down to previously installed equipment bases/foundations, performing the alignment check and final adjustment prior to initial operation, testing and commissioning in accordance with the manufacturer's tolerances and instructions and the Specification. All factory assembled rotating machinery shall be checked for alignment and adjustments made as necessary to re-establish the manufacture’s limits suitable guards shall be provided for the protection of personal on all exposed rotating and / or moving machine parts and shall be designed for easy installation and removal for maintenance purpose. The spare equipment(s) shall be installed at designated locations and tested for healthiness.

The vendor/ contractor shall apply oil and grease of the proper specification to suit the machinery, as is necessary for the installation of the equipment. Lubricants used for installation purposes shall be drained out and the system flushed through where necessary for applying the lubricant required for operation. The vendor/ contractor shall apply all operational lubricants to the equipment installed by him.

All oil, grease and other consumables used in the Works/ Equipment shall be purchased in India unless the vendor/ contractor has any special requirement for the specific application of a type of oil or grease not available in India. If such is the case, he shall declare in the proposal, where such oil or grease is available. He shall help purchaser in establishing equivalent Indian make and Indian vendor/ contractor. The same shall be applicable to other consumables too.

The vendor/ contractor shall furnish the following:

- All oil for initial filling of all equipment supplied, plus 10% additional.
- Grease if required for initial filling of all of the equipment, plus 10% additional.

- Flushing fluids to flush and clean all systems.

ii. Provisions for Exposure to Hot and Humid climate

Outdoor equipment supplied under the specification shall be suitable for service and storage under tropical conditions of high temperature, high humidity, heavy rainfall and environment favourable to the growth of fungi and mildew. The indoor equipment's located in non-air conditioned areas shall also be of same type.

5. COLOUR SCHEME AND CODES FOR PIPE SERVICE/ PANELS

All internal equipment and wiring shall be neatly and clearly marked as indicated on the schematic and wiring diagrams. Internal wiring and cables shall be marked with sleeve type engraved marking. Marking system and marking material shall be subject to approval by Owner. Identification of the respective conductors shall be in accordance with the requirements of IEC publication 204. In cable having 5 conductors or more the individual conductors shall be numbered throughout the entire length. In cables having less than 5 conductors colour coding in accordance with IEC Recommendations 204 shall be used.

The vendor/ contractor shall propose a colour scheme for those equipment/Items for which the colour scheme has not been specified in the specification for the approval of purchaser. The decision of purchaser shall be final. The scheme shall include,

Live parts of electrical connections shall be colour coded as follows,

Conductor Designation	Coding Alphanumeric	Symbol	Colour
AC network 3 phase	Phase 1	R	Red
	Phase 2	Y	Yellow
	Phase 3	B	Blue
	Neutral	N	Black
AC single phase	Phase	P	Red
	Neutral	N	Black
	Earth	E	Green yellow
DC network	Positive	a	Red
	Negative	b	Black

Colour Coding for Mimic Diagrams

Mimic diagrams to be arranged on switchgear cubicles, control panels/desks, etc., shall be colour coded as follows,

420kV	Gold
13.8kV	Signal red
415V	Black
220V DC	Violet
48V DC	White

All the steel works shall be thoroughly cleaned of rust, scale, oil, grease, dirt and scarf by pickling, emulsion cleaning, etc. The sheet steel shall be phosphated /oven dried and then painted with two coats of zinc rich primer paints. After application of the primer, two coats of finished synthetic enamel paint shall be applied. The colour of the finished coats inside shall be glossy white and exterior of the treated sheet steel shall be shade 631 of IS 5 /RAL 7032 for all switchboard /MCC/distribution board, control panels etc.

Sufficient quantities of touch paint shall be furnished for application at site. All the indoor cubicles shall be the same as exterior surface and for other miscellaneous items, colour scheme will be approved by the purchaser.

6. PROTECTION

All coated surfaces shall be protected against abrasion, impact, discoloration and any other damages. All exposed threaded portions shall be suitably protected with either a metallic or a non-metallic protecting device. All ends of all valves, pipings and conduit equipment connections shall be properly sealed with suitable devices to protect them from damage.

All equipment accessories and wiring shall have fungus protection, involving special treatment of insulation and metal against fungus, insects and corrosion. The parts which are likely to get rusted, due to exposure to weather should also be properly treated and protected in a suitable manner. Screens of corrosion resistant material shall be furnished on all ventilating louvers to prevent entry of insects.

7. FUNGI-STATIC VARNISH

Besides the space heaters, special moisture and fungus resistant varnish shall be applied on the parts, which may be subjected or predisposed to the formation of fungi due to the presence or deposit of nutrient substances. The varnish shall not be applied to any surface of part where the treatment will interface with the operation or performance of the equipment. Such surfaces or parts shall be protected against the application to the varnish

8. SURFACE FINISH

All interiors and exteriors of tanks, control cubicles and other metal parts shall be thoroughly cleaned to remove all rust, scales, corrosion, greases or other adhering foreign matter. All steel surfaces in contact with insulating oil as far as accessible, shall be painted with not less than two coats of heat resistant, oil insoluble, insulating paints.

All metal surfaces exposed to atmosphere shall be given two primer coats of zinc chromate and two coats of epoxy paint with epoxy base thinner. All metal parts not accessible for painting shall be made of corrosion resisting material. All machine finished or bright surfaces shall be coated with a suitable preventive compound and suitably wrapped or otherwise protected. All paints shall be carefully selected to withstand tropical heat and extremes of weather within the limit specified. The paint shall not scale off or wrinkle or be removed by abrasion due to normal handling.

9. GALVANIZING

The minimum weight of the zinc coating shall be 610 gm/sq.m and minimum average thickness of coating shall be 86 microns for all items having thickness 6mm and above. For items lower than 6mm thickness requirement of coating thickness shall be as per relevant ASTM. For surface which shall be embedded in concrete, the zinc coating shall be 610 gm/sqm minimum.

10. TRANSPORT AND PACKING

i. Packing

The bidder is advised to have a total study of all aspects of transportation of equipment's to site and should make schedule of transportation in accordance with the prevailing conditions at site. The bidder shall specifically understand that the Purchaser will do the general co-ordination of storage and erection works as well as civil engineering works of power house. An appropriate Period for transportation shall be considered accordingly.

The delivery dates, transportation and erection periods and for all other associated activities indicated in the Contract Documents shall be strictly adhered to. Changes, which are unavoidable or necessary, will be regulated in accordance with the stipulations laid down in the General Conditions of Contract.

From the time of manufacturing until commissioning all parts of the plant shall be protected and insured at the vendor/ contractor's expense against loss & damage of any kind. Parts, which are damaged during transport, storage, erection or trial operation, shall be replaced at the vendor/ contractor's expense.

ii. Packing and Marking

The vendor/ contractor shall prepare all plant, devices and materials for shipment to protect them from damage in transit, and shall be responsible for and make good all damages due to improper preparations, loading or shipment.

After the workshop assembly and prior to dismantling for shipment to the Site, all items of machinery and plant shall be carefully marked to facilitate site erection. Wherever applicable, these markings shall be punched or painted so that are clearly visible.

Dismantling shall be done into convenient sections, so that the weights and sizes are suitable for transport to Site and for handling on the Site under the special conditions of the Project.

All individual pieces shall be marked with the correct designation shown on the vendor/ contractor's detailed drawings and other documents (packing, lists, spare part lists, in Operating and Maintenance Instructions, etc.).

Each piece, separately shipped, or smaller parts packed within the same case or box, shall be legibly, marked to show the unit to which it is a part and match-marked to show its relative Position in the unit.

Unit marks and match-marks shall be done preferably by punching the marks into the metal before painting, galvanizing, etc., and shall be clearly legible after painting, galvanizing etc. In labelling, the vendor/ contractor shall endeavour to use as few designations as possible, and each part of identical size and detail shall have the same designation, regardless of its final position in the plant.

All parts of the plant shall be packed at the place of manufacture; the packing shall be suitable for shipment by sea and for all special requirements of the transportation to Site. Where necessary, double packing shall be used in order to prevent damage and corrosion during intermediate storage.

All identical members shall be packed together, if reasonably possible, in a form convenient for shipment and handling.

Small items shall be packed in boxes and large items shall be protected where necessary, by timber, straw and sacking. Drums shall be used for electric cables, steel ropes, steel wire and similar materials. All bolts, nuts, washers. etc., shall be packed in containers. Each container shall include only bolts, nuts or washers of identical size.

All parts shall be suitable protected against corrosion, water, sand, heat, atmospheric conditions, shocks, impact, vibrations, etc.

All electrical parts shall be carefully protected from damage by sand, moisture, heat or humid atmospheric conditions by packing them in high pressure polyethylene foil. Where parts may be affected by vibration, they shall be carefully protected and packed to ensure that no damage will occur while they are being transported and handled.

Spare parts shall be packed separately and designated as specified and shall be delivered properly and adequately packed for several years' storage. All packing costs shall be included in the scope of Work.

iii. Shipping marks

The vendor/ contractor shall mark all containers with the implementing document number pertinent to the shipment. Each shipping container shall also be clearly marked on at least two sides as follows,

Consignee:

Contract No.:

Port of destination:

Item number (if applicable):

Package number, in sequence:

Quantity per package:

Description of Work:

Net and gross weight, volume, Dimensions:

iv. Packing lists

The vendor/ contractor shall provide the Purchaser with one (1) original and two (2) copies of all shipping documents and relevant packing lists of each shipment of equipment items after the same has been shipped. One copy (1) of the packing list shall sent to the Purchaser's Representative. All packing lists shall contain the name of the vendor/ contractor or supplier and shall show the complete markings on each packed box or crate that has been shipped. Separate packing lists shall be prepared for each and all shipments made. One copy of the packing list shall be placed inside each box or crate, and one copy inserted in a weatherproof envelope affixed to the outside of each box or crate.

11. HANDLING, STORING AND INSTALLATION

Vendor/ contractor may engage manufacturer's Engineers to supervise if required for unloading, transportation to site, storing, testing and commissioning of the various equipment being procured by them separately. In case of any doubt/misunderstanding as to the correct interpretation of manufacturer's drawings or instructions, necessary clarifications shall be obtained from the purchaser. Vendor/ contractor shall be held responsible for any damage to the equipment consequent to not following manufacturer's drawings/instructions correctly.

Where assemblies are supplied in more than one section, vendor/ contractor shall make all necessary mechanical and electrical connections between sections including the connection between buses. Vendor/ contractor shall also do necessary adjustments/alignments necessary for proper operation of circuit breakers, isolators and their operating mechanisms. All components shall be protected against damage during unloading, transportation, storage, installation, testing and commissioning.

Vendor/ contractor shall be responsible for examining all the shipment immediately of any damage, shortage, discrepancy etc. for the purpose of Purchaser's information only. Any demurrage, pilferage and other such charges claimed by the transporters, railways etc. shall be to the account of the vendor/ contractor. The vendor/ contractor shall be fully responsible, for the equipment/material until the same is handed over to the purchaser in an operating condition after commissioning.

The minimum phase to earth, phase to phase and section clearance along-with other technical parameters for the various switchyard voltage levels to be maintained shall be strictly as per the approved drawings.

The design and workmanship shall be in accordance with the best engineering practices to ensure satisfactory performance throughout the service life. If at any stage during the execution of the Contract, it is observed that the erected equipment(s) do not meet the above minimum clearances, the vendor/ contractor shall immediately proceed to correct the discrepancy at his risks and costs.

12. DEGREE OF PROTECTION

The enclosures of the Control Cabinets, Junction boxes and Marshalling boxes panels etc. to be installed shall be provided with degree of protection as detailed here under,

a) Installed out door: IP-55

b) Installed indoor in air conditioned area: IP-42

c) Installed in covered area IP:52

d) For LT switchgear (AC & DC distribution Boards): IP-54

The degree of protection shall be in accordance with IS:13947, (Part-1)/ IEC-947(Part-1). Type test report/or degree of protection test on each type of the box shall be submitted for approval.

13. RATING PLATES, NAME PLATES AND LABELS

Each major and auxiliary item of equipment shall have a nameplate permanently affixed thereto, or as directed, showing in a legible and durable manner the serial number, name and address of the manufacture, rated capacity, speed, electrical characteristics, and other significant information, as applicable. Nameplates of distributing agents only will not be acceptable. Nameplates shall also be provided for identification of all panels, cubicles and other enclosures as well as for panel-mounted devices, dials, gauges instruments and control devices. Nameplates shall be marked with the nomenclature and units of measurement used in the metric system (SI- units), and a schedule of such markings shall be submitted for review. Type of nameplates and wording on identification nameplates shall be submitted in **English for approval**. The Owner will translate the text if needed and the vendor/ contractor shall furnish and attach the nameplates.

Cautionary signs: English shall be used as prime language on nameplates required for caution or warning signs, identification plates for control devices, and instruction plates.

Other nameplates: Nameplates which are not required for the operation of the equipment and are not of a cautionary or warning nature required for the safety of personnel, i.e. showing motor speeds, horsepower, electrical characteristics, name and address of manufacturer and other information necessary for maintenance and repair work are to be in English.

14. EARTHING

Circuit breakers, LA, Isolator, CVT, CT, BPI shall be provided with two grounding pads suitable for connection to galvanized steel flat. Control panels, Relay panel, outdoor marshalling boxes, Junction boxes, lighting panels and distribution board shall be provided with two grounding pads, for connection to galvanized steel flat. The two pads shall be provided, one each at the middle of the two opposite sides of the bottom frame of the equipment. Earthing of hinged door shall be done by using a separate earth wire.

All equipment such as cubicles, motors, etc. shall be connected directly to the grounding system using copper wire of area not less than 50 mm2 at two different points. In general all iron parts such as supports, covers, railing, etc. shall be connected to the grounding system. Each conductor shall have its own separate connection point. Pressed on closed shoes shall be used for connections to bars.

15. TERMINAL BLOCKS AND WIRING

i. Wiring

Wiring within cubicles and equipment enclosures shall conform to requirements of this section unless otherwise specified. Control wiring shall be stranded copper and shall be not smaller than 2.5 mm2, except as otherwise agreed by the Owner. Larger size wiring shall be used where needed for the current carrying capacity requirements.

Cables shall have at least 1100 V PVC insulation except for 220V DC and telemetering or communication system equipment for which 650V and 300V rating respectively are acceptable.

For current and potential transformer secondary circuits the cross section of the conductors shall not be less than 6 mm2 and 4 mm2 respectively.

Wiring shall terminate at terminal blocks at one side only. Where tap connections are required they shall be made on terminal blocks. Wiring shall be neatly arranged and laid in conduits accessible from the front door. The conduits shall not be filled more than 70%.

Each cubicle shall be provided with an earthing bar (PE) of sufficient cross section carrying any possible fault current without undue heating. All metallic parts of the cubicle not forming part of the live circuits, all instrument transformer terminals to be earthed and

other earthing terminals as well as all cable screens and PE-wires shall be connected to the earthing bar.

ii. Terminal blocks

The terminal blocks shall be located to allow a neat and easy connection work and shall be safely accessible while the equipment is in service. Control circuits and power circuits shall be completely separated by use of divided or separate terminal blocks. Power terminal blocks shall be rated in accordance with applicable standards, and shall be provided with covers. Control wiring terminal shall be equipped with facilities for opening the circuit. It shall be possible to interchange a single terminal block for a new one without dismantling a whole row. Current transformer terminal blocks shall have provisions for short circuiting. Not more than two wires shall be connected to any one terminal. Terminal blocks using screws acting directly on the wire will not be accepted. At least 20% spare terminals shall be provided. Terminals shall be marked with printed labels.

But preferably the terminal blocks shall be **non-disconnecting stud type equivalent to Elmex type CATM4, Phoenix cage clamp type of Wedge** or equivalent. The Insulating material of terminal block shall be nylon 6.6 which shall be free of halogens, fluorocarbons etc.

Terminal block for current transformer and voltage transformer secondary leads shall be provided with **test links and isolating facilities.** The current transformer secondary leads shall also be provided with short circuiting and earthing facilities.

There shall be a minimum clearance of 250mm between the first bottom row of terminal block and the associated cable gland plate. Also the clearance between two rows of terminal blocks shall be a minimum of 150 mm. The Supplier shall furnish all wire, conduits and terminals for the necessary inter-phase electrical connection (where applicable) as well as between phases and common terminal boxes or control cabinets.

All input and output terminals of each control cubicle shall be tested for surge withstand capability in accordance with the relevant IEC Publications, in both longitudinal and transverse modes. The supplier shall also provide all necessary filtering, surge protection, interface relays and any other measures necessary to achieve an impulse withstand level at the cable interfaces of the equipment.

16. ELECTRICAL EQUIPMENT ENCLOSURE

i. General

All electrical equipment, apparatus and devices shall be of suitable design for satisfactory operation under the conditions prevailing at the Site. The equipment shall operate satisfactorily under normal load and voltage variations in accordance with IEC Publications.

The design shall also include all necessary provisions ensuring the safety of the operating and maintenance personnel.

All electrical connections and contacts shall be of ample cross section and capacity for carrying continuously the specified currents without undue heating and shall be secured by bolts or set-screws of ample size, fitted with locknuts or lock washers of approved types.

Unless otherwise expressly stated, conductors and all other current carrying parts shall be electrolytic copper in accordance with approved, applicable standards.

Cubicles and other enclosures containing electrical equipment shall be especially treated to prevent corrosion. All cubicles shall be provided with a door switched lighting fixture and a single phase socket for power outlet.

All interior surfaces of electrical apparatus, enclosures etc. including contactors, relays, coils, etc., shall be treated in an approved manner to prevent mould growth. Such treatment shall in no way interfere with the proper operation of the equipment either electrically or mechanically.

Bigger assemblies such as switchboards, etc., shall be designed to present suitable transportation divisions adapted to the local conditions within the plant.

Unless otherwise specifically called for or described in these Contract Documents all electrical appliances shall conform to the applicable IEC Publications.

ii. Construction requirements

All cubicles and enclosures shall be of good quality standard production subject to approval by the Owner. Cubicles shall be free floor standing type, of rigid frame covered with removable steel sheets. The frame shall be bolted to the floor. There shall be provision and enough space for entrance of cables from above or below as necessary. The cubicles shall be ventilated if needed; in this case removable filter inserts shall be fitted to the air entrance openings. Provision for cable fastening shall be inside the cubicles and enclosures, and sufficient space from cable fastenings to nearest terminal. All control and indicating instruments such as contactors, circuit breakers, auxiliary relays, indicating instruments, switches etc., shall be functionally displayed in appropriate location. All indicating devices shall be visible with the door closed. The layout is subject to the approval of the Owner.

If required, flush mounted hinged steel doors with latches shall be available: doors shall be with approved locks. The locks shall be of the same type throughout the plant. All panels and cubicles shall have a uniform appearance.

The cubicles and enclosures shall be of protection class IP 54 or higher according to their location, unless otherwise, there are constraints which may prevent to maintain above protection class and same shall be justified by the vendor/ contractor and approval shall be taken from the owner for the deviation. All cubicles shall be equipped with automatically controlled heating elements for protection against internal condensation and moisture.

All panels/cubicles shall have approximately 20% space for mounting of future devices.

All door, removable covers and plates shall be gasketed all around with suitably profiled **Neoprene gaskets.** The gasket shall be tested in accordance with approved quality plan. The quality of gasket shall be such that it does not get damaged /cracked during the years of the equipment or its major overhaul whichever is earlier. All gasketed surfaces shall be smooth, straight and reinforced if necessary to minimize distortion and to make a tight seal. Ventilating Louvers, if provided, shall have screen and filters. The screen shall be fine wire mesh made of brass.

All boxes/ cabinets shall be designed for the entry of cables from bottom by means of weather proof and dust-proof connections. Boxes and cabinets shall be designed with generous clearances to avoid interference between the wiring entering from below and any terminal blocks or accessories mounted within the box or cabinet. Suitable cable gland plate projecting atleast 150 mm above from the base of the Marshalling Kiosk/ box shall be provided for this purpose along with the proper blanking plates. Necessary number of cable glands shall be supplied and fitted on this gland. The gland shall project at least 25mm above gland plate to prevent entry of moisture in cable crutch. Gland plate shall have provision for some future glands to be provided later, if required.

17. SPACE HEATERS

The heater shall be suitable for continuous operation at 240 V AC supply voltage and shall be provided with on – off switch and fuse shall be provided for heater.

One or more adequately rated, thermostatically connected heaters shall be supplied to prevent condensation in any compartment.

18. QUALITY

All materials, components and equipment covered under this specification shall be procured, manufactured, erected, commissioned and tested at all the stages, as per a comprehensive Quality Assurance Programme. An indicative programme of inspection/tests to be carried out by the vendor/ contractor for some of the major items is given in the respective technical specification. This is, however, not intended to form a comprehensive programme as it is the vendor/ contractor's responsibility to draw up and implement such programme duly approved by the Employer. The detailed Quality Plans for manufacturing and field activities shall be drawn up by the Bidder and will be submitted to Employer for approval. Schedule of finalisation of such quality plans will be finalised before award.

Manufacturing Quality Plan will detail out for all the components and equipment, various tests/ inspection, to be carried out as per the requirements of this specification and standards mentioned therein and quality practices and procedures followed by vendor/ contractor's/ sub-contractor's/ sub-supplier's Quality Control Organisation, the relevant reference documents and standards, acceptance norms, inspection documents raised etc., during all stages of materials procurement, manufacture, assembly and final testing/

performance testing. The Quality Plan shall be submitted on electronic media e.g. E-mail in addition to hard copy, for review and approval. After approval the same shall be submitted in compiled form on CD-ROM.

Field Quality Plans will detail out for all the equipment, the quality practices and procedures etc. to be followed by the vendor/ contractor's "Site Quality Control Organisation", during various stages of site activities starting from receipt of materials/equipment at site.

The Bidder shall also furnish copies of the reference documents/plant standards/ acceptance norms/tests and inspection procedure etc., as referred in Quality Plans along with Quality Plans. These Quality Plans and reference documents/ standards etc. will be subject to Employer's approval without which manufacturer shall not proceed. These approved documents shall form a part of the contract. In these approved Quality Plans, Employer shall identify customer hold points i.e. test/checks which shall be carried out in presence of the Employer's Project Manager or his authorised representative and beyond which the work will not proceed without consent of Employer in writing. All deviations to this specification, approved quality plans and applicable standards must be documented and referred to Employer along with technical justification for approval.

No material shall be dispatched from the manufacturer's works before the same is accepted, subsequent to pre dispatch final inspection including verification of records of all previous tests/inspections by Employer's Project Manager/Authorised representative and duly authorised for dispatch by issuance of Material Dispatch Clearance Certificate (MDCC).

All material used for equipment manufacture including casting and forging etc. shall be of tested quality as per relevant codes/ standards. Details of results of the tests conducted to determine the mechanical properties; chemical analysis and details of heat treatment procedure recommended and actually followed shall be recorded on certificates and time temperature chart. Tests shall be carried out as per applicable material standards and/or agreed details.

The vendor/ contractor shall submit to the Employer Field/ Site Welding Schedule for field welding activities. The field/site welding schedule shall be submitted to the Employer along with all supporting documents, like welding procedures, heat treatment procedures, procedures etc. at least ninety days before schedule start of erection work at site.

All welding and brazing shall be carried out as per procedure drawn and qualified in accordance with requirements of ASME Section IX/ BS-4870 or other International equivalent standard acceptable to the Employer.

All welding/brazing procedures shall be submitted to the Employer or its authorised representative for approval prior to carrying out the welding/brazing.

All brazers, welders and welding operators employed on any part of the contract either in vendor/ contractor's/ sub-contractor's works or at site or elsewhere shall be qualified as per ASME Section-IX or BS- 4871 or other equivalent International Standards acceptable to the Employer.

Welding procedure qualification & Welder qualification test results shall be furnished to the Employer for approval. However, where required by the Employer, tests shall be conducted in presence of Employer/authorised representative.

Any other statutory requirements for the equipment/systems shall also be complied with. On all back-gauged welds MPI/LPI shall be carried before seal welding.

Unless otherwise proven and specifically agreed with the Employer, welding of dissimilar materials and high alloy materials shall be carried out at shop only.

No welding shall be carried out on cast iron components for repair.

All the heat treatment results shall be recorded on time temperature charts and verified with recommended regimes.

The vendor/ contractor shall list out all major items/ equipment/ components to be manufactured in house as well as procured from sub-contractors (BOI). All the sub-contractor proposed by the vendor/ contractor for procurement of major bought out items including castings, forging, semi-finished and finished components/equipment etc., list of which shall be drawn up by the vendor/ contractor and finalised with the Employer, shall be subject to Employer's approval. The vendor/ contractor's proposal shall include vendor's facilities established at the respective works, the process capability, process stabilization, QC systems followed, experience list, etc. along with his own technical evaluation for identified sub-contractors enclosed and shall be submitted to the Employer for approval within the period agreed at the time of pre-awards discussion.

For components/equipment procured by the vendor/ contractors for the purpose of the contract, after obtaining the written approval of the Employer, the vendor/ contractor's purchase specifications and inquiries shall call for quality plans to be submitted by the suppliers. The quality plans called for from the sub-contractor shall set out, during the various stages of manufacture and installation, the quality practices and procedures followed by the vendor's quality control organisation, the relevant reference documents/standards used, acceptance level, inspection of documentation raised, etc. Such quality plans of the successful vendors shall be finalised with the Employer and such approved Quality Plans shall form a part of the purchase order/ contract between the vendor/ contractor and sub-contractor. Within three weeks of the release of the purchase orders /contracts for such bought out items /components, a copy of the same without price details but together with the detailed purchase specifications, quality plans and delivery

conditions shall be furnished to the Employer on the monthly basis by the vendor/ contractor.

Employer reserves the right to carry out quality audit and quality surveillance of the systems and procedures of the vendor/ contractor's or their sub-contractor's quality management and control activities. The vendor/ contractor shall provide all necessary assistance to enable the Employer carry out such audit and surveillance.

The vendor/ contractor shall carry out an inspection and testing programme during manufacture in his work and that of his subcontractor's and at site to ensure the mechanical accuracy of components, compliance with drawings, conformance to functional and performance requirements, identity and acceptability of all materials parts and equipment. Vendor/ contractor shall carry out all tests/inspection required to establish that the items/equipment conform to requirements of the specification and the relevant codes/standards specified in the specification, in addition to carrying out tests as per the approved quality plan.

Quality audit/surveillance/approval of the results of the tests and inspection will not, however, prejudice the right of the Employer to reject the equipment if it does not comply with the specification when erected or does not give complete satisfaction in service and the above shall in no way limit the liabilities and responsibilities of the vendor/ contractor in ensuring complete conformance of the materials/equipment supplied to relevant specification, standard, data sheets, drawings, etc.

For all spares and replacement items, the quality requirements as agreed for the main equipment supply shall be applicable.

Repair/rectification procedures to be adopted to make the job acceptable shall be subject to the approval of the Employer/ authorised representative.

19. DOCUMENTATION

i. List of Documents

The bidder shall submit a detailed list of drawings / documents along with the bid proposal which he intends to submit to the Employer after award of the contract.

The supplier shall necessarily submit all the drawings / documents unless anything is waived.

All engineering data submitted by the vendor/ contractor after final process including review and approval by the Employer shall form part of the Contract Document and the entire works performed under this specification shall be performed in strict conformity, unless otherwise expressly requested by the Employer in Writing.

ii. Drawings

All drawings submitted by the vendor/ contractor including those submitted at the time of bid shall be in sufficient detail to indicate the type, size, arrangement, material description, Bill of Materials, weight of each component, break-up for packing and shipment, the external connections, fixing arrangement required, the dimensions required for installation and interconnections with other equipment and materials, clearances and spaces required for installation and interconnection between various portions of equipment and any other information specifically requested in the specifications.

Each drawing submitted by the vendor/ contractor shall be clearly marked with the name of the Employer, the unit designation, THDCIL contract no. and the name of the Project. If standard catalogue pages are submitted, the applicable items shall be indicated therein. All titles, noting, markings and writings on the drawing shall be in English. All the dimensions should be in metric units.

Further work by the vendor/ contractor shall be in strict accordance with these drawings and no deviation shall be permitted without the written approval of the Employer if so required.

All manufacturing and fabrication work in connection with the equipment prior to the approval of the drawing shall be at the vendor/ contractor's risk. The vendor/ contractor may make any changes in the design which are necessary to make the equipment conform to the provisions and intent of the Contract and such changes will again be subject to approval by the Employer. Approval of vendor/ contractor's drawing or work by the Employer shall not relieve the vendor/ contractor of any of his responsibilities and liabilities under the Contract.

iii. Approval Procedure

The scheduled dates for the submission of these as well as for, any data/information to be furnished by the Employer would be discussed and finalised at the time of award. The supplier shall also submit required no. of copies as mentioned in this specification of all drawings/design documents/test reports for approval by the Employer. The following schedule shall be followed generally for approval.

i.	Approval/comments/by employer on Initial submission	Within 3 weeks of receipt
ii.	Resubmission	Within 2 (two) weeks (whenever from date of comments required) Including both ways postal time.
iii.	Approval or comments	Within 2 weeks of receipt of resubmission
iv.	Furnishing of distribution copies	2 weeks from the date of last approval.

Note: The vendor/ contractor may please note that all resubmissions must incorporate, all comments given in the submission by the Employer failing which the submission of documents is likely to be returned. Every revision shall be a revision number, date and subject, in a revision block provided in the drawing, clearly marking the changes incorporated.

The title block of drawings shall contain the following information incorporated in all contract drawings. Please refer below mention Title block for Submission of Documents.

Title Block

Customer	M/s THDC India Ltd., Rishikesh, Uttarakhand
Project:	Vishnugad Pipalkoti Hydro Electric Project (4X111MW)
Vendor/ contractor:	Bharat Heavy Electricals Ltd.

iv. Documents to be Submitted along with Offer

1. Drawings
2. Guaranteed Technical Particulars
3. Type Test Reports
4. Manufacturing Quality Plan

v. Documentation Schedule

Sl. No.	Description	Tender Stage	Contract stage for approval	Final Documentation	
			Prints	Prints	CDs
1	Drawings and Data Sheets	1	5	10	-
2	Drawings "As Built "	-	-	10	04
3	Type Test Reports	1	2	3	-
4	Erection Manuals	-	2	4	-
5	Operation and Maintenance Manuals	-	2	4	-
6	Manufacturing Quality Plan	1	2	4	-
7	Field Quality Plan	1	2	4	-
8	Inspection Test Reports	-	-	4	-

Soft copies of drawings at contract stage shall also be submitted in **PDF format**. Drawings will also be submitted in CD in **AUTOCAD** package for all major items. Final Documentation shall be submitted in bound volumes with Customer & Project etc. written on top.

20. ELECTRICAL MEASUREMENTS

All Electrical instruments shall be of flush mounted design, dust and moisture-proof. AC Ammeter and Voltmeters shall have moving iron system of not less than 1.5 accuracy class for connection to the secondary side of instruments transformer.

The indicating elements of each digital indicator shall be seven segment LED illumination type. The number of digits of each digital indicator shall be selectable to be sent the required indication. The watt and the var indicators for the circuits where direction of power flow may be changed, shall be provided with "+" and "- "signs.

All transducers shall be solid –state type with an output signal range of 4-20mA DC OR 1 to 5V DC, unless otherwise specified.

All wells for capillary type thermometers, resistance temperature sensors and thermocouples shall be of the weld-in type. Wells for thermometers and temperature sensors of the screw-in type shall be restricted to measuring points for lubrication oil, and to such measuring points where welding is not suitable, e.g., at cast-iron parts. Shop-welded thermometer wells be covered by screw caps for protection during transportation and erection.

Resistance thermometers and thermocouples shall be equipped with waterproof connection heads. Thermometer arrangements shall be such that the connection heads do not become warmer than 80OC, and the measuring inserts are easily exchangeable.

The temperature sensors shall be selected in such a way to minimize the number of different spare inserts.

Contents

Annexure-A: Compliance Certificate of Technical Specification....2
Annexure-B: Deviation/ Change Request of Technical Specification 3
Annexure-C: Guaranteed Technical Particulars....**Error! Bookmark not defined.**
Annexure-D: Technical Checklist 4

Annexure-A: Compliance Certificate of Technical Specification

The bidder shall confirm compliance to the following by signing and stamping this compliance certificate and furnishing same with the offer.

1. The scope of supply, technical details, construction features, design parameters etc. shall be as per technical specification & there are no exclusion/ deviation with regard to same.

2. There are no deviation(s) with respect to specification other than those furnished in the schedule of deviations.

3. Only those technical submittals which are specifically asked for in Notice Inviting Tender (NIT) to be submitted at tender stage shall be considered as part of offer. Any other submission, even if made, shall not be considered as part of technical offer.

4. Any comments/ clarifications on technical/ inspection requirements furnished as part of bidder's covering letter shall not be considered by BHEL, and bidder's offer shall be construed to be in conformance with the specification.

5. Any changes made by the bidder in the price schedule with respect to the description/ quantities from those given in 'BOQ' of the specification shall not be considered (i.e., technical description & quantities as per the specification shall prevail).

Date: Bidder's Stamp & Signature

Annexure-B: Deviation/ Change Request of Technical Specification

Bidder shall list out all technical potential deviation/ change request (s) along with clause with respect to technical specifications.

Sl. no.	Page no.	Clause no.	Deviation(s)	Reason(s)/ Justification(s)

Any deviation not specifically brought out in this section shall not be admissible for any commercial implication at later stage. Except to the technical deviations listed in this schedule, bidder's offer shall be considered in full compliance to the tender specifications irrespective of any such deviation indicated / taken elsewhere in the submitted offer.

Date: Bidder's Stamp & Signature

ANNEXURE-1

SCHEDULE OF GUARANTEED & OTHER TECHNICAL PARTICULARS

A. 400 kV XLPE Insulated Power Cables.

1. Manufacturer's name & country of origin
2. Standard according to which Cable is manufactured and tested
3. Type
4. No. of phases per circuit
5. No. of cables per phase
6. No. of core per cable
7. Rated voltage*
8. Highest system voltage*
9. Rated continuous current*
10. Rated short-time withstand current for 1 sec.*
    a) for conductor
    b) for metallic sheath
11. Electrical Stresses (A.C. Voltage) Short circuit forces*
    a) On conductor
       i) Average
       ii) Maximum

    b) On Inner Semi-conductor layer
       i) Average
       ii) Maximum

    c) On outer semi-conductor layer
       i) Average
       ii) Maximum
12. Rated frequency (Hz)
13. Insulation level*

    (a) One Minute Power Frequency withstand voltage kV(rms)

    (b) 1.2/50 micro second lightning impulse withstand voltage(kV)peak

    (c) 250/2500 micro second switching impulse withstand voltage kV(peak)
14. Temperatures*

a) Max. Temperature rise over ambient temperature of 38 deg C.

b) Maximum permissible operating conductor temperature

c) Maximum permissible conductor temp. during short circuit

d) Heating time constant when cable is switched on

i) From zero load (cold condition) to a load of continuous current and corresponding conductor temperature.

ii)From zero load (cold condition) to a load of maximum continuous current

(offered by bidder) to attain 90 ^{0}C temperature, keeping the load constant.

15. Power Losses*

a)	Guaranteed power loss in conductor in each length of 400 m approx. or as required (without tolerance) conductor temperature of 90^o C.	(Watts)
b)	Guaranteed Dielectic power loss in each length of 400 m approx. or as required (without tolerance) conductor temperature of 90^o C.	(Watts)
c)	Guaranteed power loss in metallic sheath for each length of 400 m approx. or as required (without tolerance)at conductor temperature 90^o C	(Watts)
d)	Guaranteed total power losses in each length of 400 m approx. or as required (without tolerance) conductor temperature of 90^o C (a+b+c)	(Watts)
e)	Max. permissible iron losses in supporting structures	(KW)

16. Maximum total power losses per metre at conductor temperature of 90 deg C (Watts)

17. Conductor details

(a) Type

(b) Material and shape

(c) Material Cross-sectional area (mm^2)

(d) Conductor diameter (mm)

(e) Weight of conductor (kg/m)

(f) Current density in conductor (A/mm^2)

(g) Conductivity of conductor (mho)

(h) Ultimate tensile strength of conductor

(i) Max. short-circuit current rating & duration KA/sec.

(j) Impedance of conductor per meter ohm

18. Conductor shielding

a) Material -
b) Thickness mm
c) Max. size of protrusion µm
d) Electric stress level kV/mm
i) Maximum
ii) Average

19. Insulation details

a) Material
b) Thickness mm
c) Relative permittivity -
d) Min. resistivity Ω-cm
e) Max. moisture content ppm
f) Max. size of void µm
g) Max. size of contaminant (Black metal and coloured impurity) µm

h) Dielectric loss angle (at rated voltages at 20^0C & 90^0C)	-
i) Outer dia of insulation	mm

20. Insulation shielding

a) Material	-
b) Thickness	mm
c) Max. size of protrusion	μm
d) Electric stress level	kV /mm

21. Bedding (cushion layer)

a) Material	-
b) Total thickness	mm

22. Inner sheath

a) Material	-
b) Type	-
c) Thickness	mm
d) Maximum short circuit current rating & duration	kA/sec.
e) Sheath induced voltage	V
f) Type of earthing	
g) Metallic sheath outer dia	mm
h) Mutual inductance between conductor and sheath.	

23. Outer sheath

a) Material	-
b) Type	-
c) Thickness	mm
d) Colour	-
e) Oxygen index	-
f) Carbon black contents for PE	

24. Cable outside diameter	(mm)
25. Cable weight	(Kg/m)
26. Inductive reactance per phase per meter at 20^0 C.	(ohms)
27. Capacitance per phase per meter at	(Micro Farad)

20 deg C & 50 Hz

28.	Effective AC resistance per phase per metre	(ohms)
29.	Surge impedance	(Ω)
30.	DC resistance at 20 deg C	(ohms)
31.	Max. safe continuous current at ambient temperatures varying from 2.0^0 C to 38^oC	A
32.	Charging current & power	
	a) Maximum charging current per phase	(A/km)
	b) Maximum charging current per circuit	(A/km)
	c) Maximum charging power per circuit	(kVA/km)
33.	Cable insulation resistance	MΩ
34.	Cable burn through time at rated short circuit current	(sec)
35.	Corona Extinction voltage	kV
36.	Radio interference at 266 kV (rms)	micro volts
37.	Protrusion	(Micron)
	a) Conductor shielding b) Insulation shielding	
38.	Cable test particulars	
	a) AC high voltage test	kV/min.
	b) AC high voltage long time withstand test	kV/Min.
	c) Impulse voltage withstand test	kV(Peak)
	d) Partial discharge test	kV/pC
	e) Voltage test on outer sheath	kV/Min.
	f) Impulse voltage test on outer sheath	kV(Peak)

g)	Max. Pulling tension	Kg.
h)	Max. permissible side wall pressure	Kg/m.
i)	Min. bending radius	m.
j)	Max. symmetrical short circuit current	kA/sec.
k)	Max. phase to earth short circuit Current	kA/Sec.
l)	Current carrying capacity at 30^0C,50^0C,90^0C	
	i) In flat formation	A
	ii) In trefoil formation	A
	m) Whether the cable is tested for pre qualifying tests as per IEC 62067	

B **400 kV Cable Accessories**

1. Outdoor termination

a)	Name and country of manufacturer	-
b)	Type	-
c)	Insulating medium	-
d)	Type of interface	-
e)	Material and colour of the bushing	-
f)	Bushing particulars	
	• Make	
	• Type	
	• Voltage class	
	• 1 minute power frequency withstand voltage	kVrms
	• Lightning impulse withstand voltage	kVpeak

- Switching impulse withstand voltage kVpeak
- Flash over values
  - Dry kV
  - Wet kV
- Puncture values kV
- Creepage distance (mm)
- Compression strength kg/cm^2
- Cantilever strength kg-m
- Pressure differential withstand capacity of conical insulators -

g) Is terminal type tested, if yes, to which standard? -

h) Overall dimensions of termination mm

i) Connecting clamps
   i) Current rating kA
   ii) Overall dimensions kA

2. Indoor Termination

a) Name and country of Manufacturer -

b) Type -

c) Insulation medium -

d) Type of interface -

e) Is terminal type tested, if yes, to which standard?

f) Overall dimensions mm

g) Overall weight Kg

3. a) Disconnecting Link

i) Material and size

ii) Continuous current rating A

iii) Momentary current rating kA

b) Earthing Devices

(i) Earthing conductor

- Material & size
- Continuous current rating A
- Momentary current rating kA

(ii) CCPU Cubicle / link box

- Material
- Size & weight
- Protection code

(iii) Technical particulars of LA (SVL)

- Type
- Rated voltage kV
- Voltage limiting range
- Fault current rating for 1 sec. kA
- Lightning impulse voltage withstand capacity kV(peak)
- Power frequency withstand voltage kv(rms)
- Momentary current rating kA
- Continuous current rating A

4. Cable drums

a) Flange diameter mm

b) Drum diameter & width mm

c) Drum weight Kg.

d) Drum material

e) Spindle hole dia mm

5. Supporting Structures:

a) Cable supporting trays/racks & structures

i) manufacturer's name
ii) Material
iii) Whether magnetic or non-magnetic type
iv) Minimum yield point
v) Total weight of the cable trays / racks kg/m
vi) Maximum span between the supports
vii) Max. temperature rise under steady state condition at maximum continuous rated current ^{0}C
viii) Max. potential rise in the event of short-circuit V

b) Terminal End Supporting Structure

i) Material / composition of material

ii) Reference standard

iii) Min. guaranteed yield point

iv) Ultimate tensile strength

v) Base dimensions
vi) Weight & size of each member of supporting structures kg

c) Cleats, Clamps, Bolts and Nuts

i) Material/composition of material

ii) Min. tensile strength of bolts kg/cm

iii)Proof load at nuts kg

6. Test Particulars For Cable Accessories

i)	AC high voltage long time withstand test	kV/Min.
ii)	Impulse voltage withstand test	kV (peak)
iii)	Partial discharge test	kV/pC
iv)	Min. creepage distance of porcelain / Epoxy resin bushing	mm/kV
v)	Max. permissible pressure of oil/SF6 (if applicable) in outdoor termination	kg/mm^2
vi)	Design pressure of oil or SF6 (if applicable) for outdoor termination	kg/mm^2
vii)	Max. permissible pressure of SF6 gas or oil (if applicable) in indoor type termination	kg/mm^2
viii)	Design pressure of SF6 gas or oil (if applicable) in indoor type termination	kg/mm^2
ix)	Permissible tension for outdoor termination	kg/mm^2
x)	Permissible tension for indoor termination	kg/mm^2

7. Bonding Cable

i) Material

ii) Size

iii) Type of bonding

iv) Current carrying capacity

C. Other Information

1. Details of interfaces

a) Max. forces at interface
- Tensile
- Compressive

b) Tolerance on positioning of flanges

c) Earthing arrangement

2. Min. recommended clearance mm
a) Between the cable
b)Between the racks (vertical)

3. Details of cable end sealing, cable clamping arrangement etc.

4. Details of cable handling, laying and pulling Device

5. Weight and dimensions of shipping packages
(a) Name and shipping weight of the heaviest package of cable drums etc. (kg)

(b) Name and dimensions (LxBxH) of the largest package

(c) Shipping weight of all special cable laying, handling devices, wrenches and tools etc (kg)

(d) Shipping wt. and dimensions of each XLPE Cable end termination.

(e) Max. length of 400 kV, single phase, single core of 800mm^2 copper conductor XLPE insulated power cable which can be supplied in single length. (m)

(f) Standard length (m)

6. Design life of cable (Yrs)

7. Cable loading

a) Continuous over loading at one go
b) Total hours of emergency to which cable can be loaded during its life.

8. Any other item/information not covered above.

Note"*" Marked against items means guaranteed values.

Annexure-D: Technical Checklist

Sl. No.	Particulars	Confirmation by Bidder	
1	**Technical Qualifying Requirement**		
1.1	The bidder to furnish relevant documents for meeting the qualifying requirement. Performance certificates (if required as per tender) shall be submitted in English. Translated pages should be attested by the ultimate customer, if attested only by the bidder, it shall be notarized.	Confirmed	Yes/ No
1.2	The bid shall be submitted by the Manufacturer of 400kV XLPE cable & accessories in case of Indian Manufacturer, however agent may submit the technical offer in case of foreign manufacturer. The bidder's scope includes supply and services such as -Unloading and installation, -Testing, commissioning and handing over	Confirmed	Yes/ No
1.3	All the documents shall be submitted in English. Translated pages should be attested by the ultimate customer, if attested only by the bidder it shall be notarized.	Confirmed	Yes/ No
2	**Un-priced BOQ**		
2.1	Confirm that all items have been quoted separately. (If any item has not been quoted, the same shall be specifically brought out with technical reasons thereof)	Confirmed	Yes/ No
2.2	Any other supply/ service required for the execution for the complete work of 400kV XLPE cable & accessories is deemed to be included in the offer, whether specifically mentioned in the BOQ or not if it is included in technical specification. Bidder to submit list of items along with their respective quantities required for completeness of 400kV XLPE cable & accessories.	Confirmed (List of items is attached)	Yes/ No
2.3	Design and supply of all structural material to be used for supporting and laying of 400kV XLPE cable on rack assembly including insert plates, anchor fasteners/ foundation bolts, plates etc. as well as consumables like grouting material etc. shall be in bidder's scope. The erection of structure materials shall also be done by bidder. In addition to above, the structure materials for supporting the end termination in vertical/ horizontal form shall also be in bidder's scope.	Confirmed	Yes/ No
2.4	Supply and services for all the structure materials of GIS end termination shall be provided by bidder.	Confirmed	Yes/ No
2.5	Confirm that the consumables (list to be enclosed by bidder during contract stage) with shelf life of two years shall be supplied before erection after specific clearance by BHEL/THDCIL.	Confirmed	Yes/ No
2.6	Supply of All the testing instruments & devices required for successful testing and commissioning of 400kV XLPE cable system at site till handing over shall be under bidder's scope.	Confirmed	Yes/ No
2.7	All tools & tackles, special tools, slings and plants shall be in bidder's scope.	Confirmed (List of items is	Yes/ No

		attached)	
2.8	Installation and fixing of materials required for earthing for complete route of XLPE cable and its end termination shall be in bidder's scope. The earth grid connection shall not be available at all points in route and, hence provisions of independent earthing including rod electrode etc. shall be deemed to be included in bidder's scope.	Confirmed	Yes/ No
2.9	The associated activities including cutting, drilling, welding, painting and fabrication etc. including minor civil works required for completion of 400kV XLPE cable work shall be in bidder's scope.	Confirmed	Yes/ No
2.10	Materials required for repair and maintenance of cables during/ after installation, if required shall be arranged by bidder to make it good to the satisfaction of BHEL/ Customer.	Confirmed	Yes/ No
2.11	Tools & tackles, testing instruments for termination/ jointing, tools for termination, scaffolding for support and making platform at elevated position, arrangement for controlled environment, crane/ hydra for lifting, heating arrangement etc. to complete termination and jointing work complete in all respect shall be bidder's scope.	Confirmed	Yes/ No
2.12	Cable accessories damaged during installation, testing & commissioning shall be made good/ repaired/ replaced by bidder to the satisfaction of BHEL/ Customer.	Confirmed	Yes/ No
3	**Technical**		
3.1	Bidder may please be noted that the exact cable length shall be decided after joint route survey during site visit and making precise measurements at contract stage. Manufacturing cable cut length and drum length shall be determined with consultation & approval with BHEL/ Customer/ Consultant. -The Payment of cables length for supply shall be as per approved quantities by BHEL/ Customer/ consultant. -The Payment of cables length installation will be as per actual measurement at site which shall also include cable terminations. -The exact length may vary by -20% to +20% at contract stage based on actual measurement at site and calculations submitted by the bidder. However, Individual quantity of other items may vary to any extent and may get deleted during contract/ execution stage.	Confirmed	Yes/ No
3.2	Bidder shall submit detailed calculation of altitude correction factor during detailed engineering stage, as per relevant IEC. Altitude correction factor shall be applied on above technical parameters for cable and accessories, if applicable.	Confirmed	Yes/ No
3.3	Bidder shall submit following design calculations, (i) Insulation dimensions including thickness of inner/ outer sheath and semi-conducting layers. (ii) Verification of thermal withstand capacity of XLPE cables for short circuit current. (iii) Conductor, conductor sheath, insulation and structure losses. (iv) Temperature rise (v) Cooling and anti-condensation behavior.	Confirmed	Yes/ No

	(vi) Voltage gradient calculations for operating voltage, highest system voltage and for transient voltage. (vii) Supporting steel structure design and calculations. (viii) Mechanical forces and stresses induced in cable conductor and metallic sheath to prove the mechanical strength.		
3.4	Further to above, bidder shall also submit the following design calculations, (i) Design calculations of 400kV XLPE cables (conductor & sheath) to withstand short circuit current for 1 sec. (ii) Design calculations for thermal withstanding capacity for short circuit current (conductor & sheath). (iii) Typical graph showing the voltage gradient along the radii of conductor and insulation for 1000A continuous current at different power factor between 0.9 (over-excited) to 0.9 (under excited). (iv) Calculation indicating that the 800sqmm copper (equivalent) conductor single phase 400 kV XLPE cable is capable to carry 1000A continuous current. (v) Calculations of cable for following, - Screen/ sheath voltage under full load condition, - Screen/ sheath voltage during an external three phase symmetrical through-fault (vi) Calculations for screen/ sheath voltage/ current and the recommended method for metallic screen bonding and screen sizing shall be designed in such a manner so that it can carry the earth fault current level of the system, considering system is solidly grounded.	Confirmed	Yes/ No
4	**Technical Deviations**		
4.1	Confirm that the Complete systems have been offered as per the requirements of Technical Specification and Technical Deviation sheet has been submitted. Deviations mentioned elsewhere in the bid will not be considered.	Confirmed	Yes/No
5	**Type Testing**		
5.1	Bidder shall ensure that the equipment (400kV XLPE Cable & its Accessories) being procured should have valid type test certificates as specified in IS/ IEC standards (e.g. IEC 62067) (amended up to date) at any independent laboratory/ NABL accredited laboratory of respective country. The validity of type test reports shall be per CEA guidelines, amended time to time.	Confirmed	Yes/No
5.2	The complete type test certificates and data sheets for cables and its accessories shall be furnished by bidder. If the tests conducted are not to the satisfaction of BHEL/ consultant/ customer, the tests shall be re-conducted by bidder without any commercial implication to BHEL. Further, in case, any of type tests have not been conducted on the offered design or there has been a change in the design after the type tests, the requisite tests shall be conducted by bidder on the offered design by bidder without any commercial implication to BHEL.	Confirmed	Yes/No
6	**Quality Plan**		
6.1	The successful bidder shall submit Quality Assurance Plan for 400kV XLPE Cable & its Accessories etc. including in-process inspection methods, tests, records, etc. for BHEL/ consultant/ customer approval. Customer hold points will also be included in the plan, which shall be mutually agreed by the BHEL/	Confirmed	Yes/No

	consultant/ customer. In case bidder has reference Quality Assurance Plan agreed with BHEL/ consultant/ customer, same shall be submitted for specific project to BHEL/ consultant/customer approval. There shall be no commercial implication to BHEL/ consultant/ customer on account of Quality Plan approval.		
7	**Inspection & Testing**		
7.1	The total losses listed in the guaranteed and other technical particulars of section-1 shall be the losses of each length of approximate 400m as mentioned above of XLPE cable. The computation of losses shall be based on specified conductor, sheath and structures at maximum operating voltage and temperature for each cable length. The computation procedures and results shall also be submitted to the purchaser for reference.	Confirmed	Yes/No
7.2	The bidder shall guarantee the above parameters of XLPE power cables and the same shall be verified at the manufacturer's works. However, in actual supplied 400kV XLPE cable, if it is found that actual losses are more than the values guaranteed above, penalty shall be levied/ recovered at the rate of INR 1,50,000 (INR One lakh fifty thousand)/ KW.	Confirmed	Yes/No
7.3	The purchaser reserves the right to reject the cable if the losses exceed the declared losses beyond tolerable limits as specified or the temperature rise of cable exceeds the guaranteed values quoted by the bidder.	Confirmed	Yes/No
7.4	To verify the actual losses, the actual DC resistance shall be measured to calculate the AC resistance of the cable, using factors as given in IEC 60287. Further, the actual loss angle (dielectric loss) and other parameters shall also be measured during testing. The actual losses may then be determined based on these measured/ calculated values.	Confirmed	Yes/No
8	**Field Testing & Commissioning**		
8.1	Bidder shall also submit site acceptance testing (SAT) procedures and get them approved from BHEL/ consultant/ customer before carrying out the site testing. Following site test as per IEC 62067, if applicable shall be conducted after laying of cable and installation of accessories. - DC voltage test of the over sheath (Cl 16.2 of IEC 62067) - AC voltage test of the insulation (Cl 16.3 of IEC 62067) - Partial discharge measurement test, if applicable	Confirmed	Yes/No

Date: Bidder's Stamp & Signature

Unpriced bid format

Bidders to mark "Quoted"in this unprice BOQ Format.

The price to be quoted in the "Price Bid Format" only which is attached separately with the Enquiry.

Tender Inviting Authority: BHEL/ TBG

Name of Item:- Supply and Services of 400 kV cable and accessories for Pipalkoti project

Enquiry/NIT No: 92G2400174 dated 15.09.2023

Name of the Bidder/ Bidding Firm / Company :	

PRICE SCHEDULE

(This BOQ template must not be modified/replaced by the bidder and the same should be uploaded after filling the relevent columns, else the bidder is liable to be rejected for this tender. Bidders are allowed to enter the Bidder Name, Quoted and applicable GST % only)

Sl. No.	Item Description	Item Code / Make	Currency (INR/USD)	Quantity	Units	Quoted (yes/No)	GST (in Percentage)
1.01	SUPPLY- HIGH VOLTAGE POWER CABLE : XLPE INSULATED, COPPER (PLAIN) CONDUCTOR, 230/400KV SINGLE CORE, 800 SQMM SIZE	A.1- Item 1		4200	MTR		
1.02	SUPPLY- HIGH VOLTAGE POWER CABLE : BONDING CABLE FOR EARTHING THE METALLIC SHEATH OF THE EHV CABLE	A.2- Item2		100	MTR		
1.03	SUPPLY- HIGH VOLTAGE POWER CABLE : EARTH CONTINUITY CONDUCTOR CABLE ALONG WITH ACCESSORIES SUITABLE/ COMPATIBLE FOR CABLE SYSTEM	A.3- Item 3		1400	MTR		
1.04	SUPPLY- HIGH VOLTAGE POWER CABLE : INDOOR/ OUTDOOR TERMINATION KIT FOR GIS END SUITABLE FOR 230/400KV, 800 SQMM SIZE	A.4- Item 4		6	SET		
1.05	SUPPLY- HIGH VOLTAGE POWER CABLE : INDOOR/ OUTDOOR TERMINATION KIT FOR CABLE SEALING END SUITABLE FOR 230/400KV, 800 SQMM SIZE	A.5- Item 5		6	SET		
1.06	SUPPLY- HIGH VOLTAGE POWER CABLE : 1 X 3 PHASE - DISCONNECTING LINK BOX WITH SVL(SHEATH VOLTAGE LIMITER SUITABLE/ COMPATIBLE FOR EHV CABLE SYSTEM WITH NECESSARY FITTINGS AND ACCESSORIES	A.6- Item 6		2	SET		
1.07	SUPPLY- HIGH VOLTAGE POWER CABLE : SINGLE POLE LINK BOX WITHOUT SVL INCLUDING ALL CABLE/CABLE ACCESSORIES REQUIRED FOR THE CONNECTION	A.7- Item 7		6	SET		
1.08	SUPPLY- HIGH VOLTAGE POWER CABLE : SUPPORT STRCUCTURE AND RACK ASSEMBLY STRUCTURE	A.8- Item 8		30	MT		
1.09	SUPPLY- HIGH VOLTAGE POWER CABLE : NONMAGNETIC, SINGLE TYPE CLEATS /CLAMPS FOR FIXING OF CABLE (AS PER REQUIREMENT)	A.9-Item 9		2200	NO		
1.10	SUPPLY- HIGH VOLTAGE POWER CABLE : MISCELLANEOUS ITEMS INCLUDING CABLE ROUTE MARKER, ELECTRODE ETC REQUIRED FOR CABLE SYSTEM	A.10- Item 10		1	LOT		
1.11	SUPPLY- HIGH VOLTAGE POWER CABLE : CONSUMABLES WITH LIMITED SHELF LIFE SUITABLE/ COMPATIBLE FOR CABLE SYSTEM	A.11- Item 11		1	LOT		
1.12	SUPPLY- HIGH VOLTAGE POWER CABLE : TOOLS, TACKLES & EQUIPMENT REQUIRED FOR OPERATION AND MAINTENANCE OF XLPE CABLE SYSTEM	A.12- Item 12		1	LOT		
1.13	SUPPLY- HIGH VOLTAGE POWER CABLE : HAND TOOLS ALONG WITH RACK	A.13- Item 13		2	SET		
1.14	SPARES- HIGH VOLTAGE POWER CABLE : BONDING CABLE FOR EARTHING THE METALLIC SHEATH OF THE EHV CABLE	B.1- Item 14		100	MTR		

Sl. No.	Item Description	Item Code / Make	Currency (INR/USD)	Quantity	Units	Quoted (yes/No)	GST (in Percentage)
1.15	SPARES- HIGH VOLTAGE POWER CABLE : INDOOR/ OUTDOOR TERMINATION KIT FOR GIS END SUITABLE FOR 230/400KV, 800 SQMM SIZE	**B.2- Item 15**		2	SET		
1.16	SPARES- HIGH VOLTAGE POWER CABLE : INDOOR/ OUTDOOR TERMINATION KIT FOR CABLE SEALING END SUITABLE FOR 230/400KV, 800 SQMM SIZE	**B.3- Item 16**		2	SET		
1.17	SPARES- HIGH VOLTAGE POWER CABLE : STRAIGHT THROUGH JOINT SUITABLE FOR 230/400KV, 800 SQMM SIZE	**B.4- Item 17**		1	SET		
1.18	SPARES- HIGH VOLTAGE POWER CABLE : 1 X 3 PHASE - DISCONNECTING LINK BOX WITH SVL(SHEATH VOLTAGE LIMITER SUITABLE/ COMPATIBLE FOR EHV CABLE SYSTEM WITH NECESSARY FITTINGS AND ACCESSORIES	**B.5- Item 18**		2	SET		
1.19	SPARES- HIGH VOLTAGE POWER CABLE : SINGLE POLE LINK BOX WITHOUT SVL INCLUDING ALL CABLE/CABLE ACCESSORIES REQUIRED FOR THE CONNECTION	**B.6- Item 19**		6	SET		
1.20	SPARES- HIGH VOLTAGE POWER CABLE : ANY OTHER ITEM NOT LISTED ABOVE BUT ARE REQUIRED FOR COMPLETENESS OF INSTALLATION & COMMISSIONING OF SYSTEM	**B.7- Item 20**		1	LOT		
2.01	Service Item: Cable- Site survey for route & length finalization of 400kV, 1Cx800sqmm Copper conductor, XLPE cable, The exact cable length shall be finalized after visiting site & making precise measurements at contract stage. Manufacturing lengths and drum length shall be determined with consultation & approval with BHEL/ Customer/ Consultant. 1. The payment of cables lengths for supply shall be as per approved quantities after survey. 2. The Payment of cables length for installation shall be as per actual measurement at site which shall also include cable terminations. 3. The length may vary by -20% to +20% at contract stage based on actual measurement at site and calculations submitted by the bidder. (1Lot=Complete requirement for package)	**Item 21**		1	LOT		
2.02	Service Item: Cable- Unloading and verification of 400kV XLPE cables and its accessories at site and shifting to BHEL store, Site visit for unloading & verification of materials for proper storage and up-keeping at site includes following activities but not limited to, 1. Complete and safe unloading of 400kV XLPE cables and its accessories at site. 2. Reconciliation, storage & upkeeping of materials for long storage (min. two years) 3. Further watch & ward shall be under the scope of BHEL/ its contrcator, till the materials are in BHEL store.	**Item 22**		1	LOT		

Sl. No.	Item Description	Item Code / Make	Currency (INR/USD)	Quantity	Units	Quoted (yes/No)	GST (in Percentage)
2.03	Service Item: Cable- Installation of 400kV, 1Cx800sqmm Copper conductor, XLPE cable, Installation of Copper conductor XLPE cable shall be complete in all respect and comprising of following but not limited to, 1. Laying of cables in horizontal/ vertical/ bent plane in flat form with proper dressing by fixing single clamps as and where required on support structure at ends/ rack assembly/ other structure assembly in tunnel. 2. Arrangement of all special tools & tackles for smooth laying & installation on returnable basis. 3. Cable tags/ marking tags, cable spacers, aluminum blocks for snaking, repair material for outer sheath, cable suspension devices, harwares shall be arranged and provided. 4. Arrangement of sand bags/ any other temporary arrangement shall be provided by bidder. 5. Any other service/(s) required to complete the work in all respects but not limited to above shall be in bidder's	**Item 23**		4200	RUNNING METER		
2.04	Service Item: Cable- Installation of bonding cable along with accessories, Installation of bonding cable shall be complete in all respect and comprising of following but not limited to, 1. Bonding cable shall be installed from metallic sheath of XLPE insulated power cables to respective disconnecting link box and then to earth grid. 2. Laying of bonding cables shall be in horizontal/ vertical/ bent plane in flat form with proper dressing by fixing suitable single clamps as and where required on support structure at ends/ rack assembly/ other structure assembly in tunnel. 3. Fixing of cable support structure for supporting termination including fixing arrangements including any other accessories. 4. Any other item/(s) including lugs/ connectors and other accessories required to complete the service shall be in bidder's scope.	**Item 24**		100	RUNNING METER		
2.05	Service Item: Cable- Installation of earthing continuity cable along with accessories, Installation of Earthing continuity cable shall be complete in all respect and comprising of following but not limited to, 1. Earthing continuity cable shall be installed between disconnecting links of both ends. 2. Laying of earthing continuity cable shall be in horizontal/ vertical/ bent plane in flat form with proper dressing by fixing suitable single clamps as and where required on support structure at ends/ rack assembly/ other structure assembly in tunnel. 3. Fixing of cable support structure for supporting termination including fixing arrangements including any other accessories. 4. Any other item/(s) including lugs/ connectors and other accessories required to complete the service shall be in bidder's scope.	**Item 25**		1400	RUNNING METER		

Sl. No.	Item Description	Item Code / Make	Currency (INR/USD)	Quantity	Units	Quoted (yes/No)	GST (in Percentage)
2.06	Service Item: Cable- Site/ field testing & commissioning of 400kV, 1Cx800sqmm Copper conductor, XLPE cable system, Field testing & commissioning of Copper conductor XLPE cable shall be complete in all respect and comprising of following but not limited to, 1. Field testing & commissioning of XLPE, Cu conductor cable along with accessories such end termination, straight through joints, if required shall be carrried out in phase manner and hence simultaneous commissioning of all the circuits is not envisaged. 2. Field testing & commissioing shall be done as per approved SAT (site acceptance test), which shall be submitted by bidder and	**Item 26**		2	CIRCUIT-NO		
2.07	Service Item: Cable Accessories- Termination of 400kV, Indoor GIS Sealing/ Termination End Kit, compatible for 400kV, 1Cx800sqmm, Copper conductor, XLPE cable, Termination of Indoor GIS Sealing/ Termination End Kit shall be complete in all respect and comprising of following but not limited to, 1. Termination work shall include all necessary arranngement for access and working such as scaffolding, heighteneded platform, temporary tent with controlled climate etc. 2. Termination/ jointing of cables shall be done by skilled and experienced jointer duly certified by OEM and approved by BHEL/ consultant/ customer. 3. Any other service/(s) required to complete the work in all respect but not limited to above shall be in bidder's scope. (1 set= 1-phase termination work)	**Item 27**		6	SET		
2.08	Service Item: Cable Accessories- Termination of 400kV, Outdoor Cable Sealing/ Termination End Kit, compatible for 400kV, 1Cx800sqmm, Copper Conductor XLPE cable, Termination of Outdoor Cable Sealing/ Termination End Kit shall be complete in all respect and comprising of following but not limited to, 1. Termination work shall include all necessary arranngement for access and working such as scaffolding, heighteneded platform, temporary tent with controlled climate etc. 2. Termination/ jointing of cables shall be done by skilled and experienced jointer duly certified by OEM and approved by BHEL/ consultant/ customer. 3. Any other service/(s) required to complete the work in all respect but not limited to above shall be in bidder's scope. (1 set= 1-phase termination work)	**Item 28**		6	SET		

Sl. No.	Item Description	Item Code / Make	Currency (INR/USD)	Quantity	Units	Quoted (yes/No)	GST (in Percentage)
2.09	Service Item: Cable Accessories- Jointing of 400kV, Straight Through Jointing kit, compatible for 400kV, 1Cx800sqmm, Copper Conductor XLPE cable, Jointing of Straight Through Jointing kit shall be complete in all respect and comprising of following but not limited to, 1. Termination work shall include all necessary arranngement for access and working such as temporary tent with controlled climate etc. 2. Termination/ jointing of cables shall be done by skilled and experienced jointer duly certified by OEM and approved by BHEL/ consultant/ customer. 3. Any other service/(s) required to complete the work in all respect but not limited to above shall be in bidder's scope. 4. This is optional item and it shall be done at site as per requirement. (1 set= 1-phase termination work)	**Item 29**		1	SET		
2.10	Service Item: Cable Accessories- Installation of 1nox3-phase Disconnecting Link Box (CCPU) with SVL at GIS end side, Installation of Disconnecting Link Box (CCPU) with SVL shall be complete in all respect and comprising of following but not limited to, 1. Installation of Disconnecting Link Box (CCPU) with SVL along with accessories such as suitable earthing arrangements(earthing electrode, earthing terminals, bi-metallic clamps, washers, lugs, pads, hardware etc.) and structural work for mounting. 2. Any other service/(s) required to complete the work in all respects but not limited to above shall be in bidder's scope.	**Item 30**		2	SET		
2.11	Service Item: Cable Accessories- Installation of 1nox1-phase Disconnecting Link Box (CCPU) without SVL at Cable Sealing end side, Installation of Disconnecting Link Box (CCPU) without SVL shall be complete in all respect and comprising of following but not limited to, 1. Installation of Disconnecting Link Box (CCPU) without SVL along with accessories such as suitable earthing arrangements (earthing electrode, earthing terminals, bi-metallic clamps, washers, lugs, pads, hardware etc.) and structural work for mounting. 2. Any other service/(s) required to complete the work in all respect but not limited to above shall be in bidder's scope.	**Item 31**		6	SET		

Sl. No.	Item Description	Item Code / Make	Currency (INR/USD)	Quantity	Units	Quoted (yes/No)	GST (in Percentage)
2.12	Service Item: Cable Accessories- Installation of Support Structure at GIS end and Rack Assembly Structure for of cable CVT/ Pothead Yard/ GIS Bulding Installation of Support Structure at GIS end and Rack Assembly Structure in Cable CVT/ Pothead Yard/ GIS Bulding shall be carried out in all respect and comprising of following but not limited to, 1. Support Structure and Rack Assembly Supports shall have sufficient strength to cater to the static & dynamic loads. 2. The zinc coating shall be uniform, clean, smooth and free from spangle as possible, and shall weigh not less than 0.61 Kg/m2 over the area covered and not less than 0.09 mm in thickness. 1. All structural materials including hardware for assembly and fixing with wall/ trench etc. required to complete the work in all respects shall be in bidder's scope. (1 Cable Circuit= Complete structure requirement for 1 cable circuit)	**Item 32**		30	MT		
2.13	Service Item: Training - Training for 400kV XLPE System of 6no. Engineers (4 no. customer engineers+2 no. BHEL engineers) for a period of at least 7 working days at Manufacturer's works, To and fro travelling charges, lodging and boarding charges of engineer shall be in BHEL/THDC scope. Only training shall be arranged at Bidder works.	**Item 33**		1	LOT		

Annexure- I

Enquiry no.:- 92G2400174 dated 15.09.2023

Item No.: 400kV XLPE Cable & Accessories (Supply+ Services)

Project: THDC Vishnugad Pipalkoti Hydro Electric Project (4X111 MW)

Prequalifying Requirement:-400kV XLPE Cable & Accessories

Bidder must comply the following requirement else offer is liable for rejection.

Bidder should be manufacturer of the 400kV XLPE Cable. Bidder needs to meet the following technical requirements & financial requirements as stipulated here under:

A) Technical PQR

Technical Qualifying Requirements & Experience

For

400kV XLPE Cable & its accessories

The bidder must have experience in design, manufacture and supply of 420kV (Um) single core conductor of min. 600mm2 copper or equivalent cross sectional area Cross Linked Poly Ethylene (XLPE) insulated power cables, which shall have been in **successful trouble free operation** for at least 2 successive years in last 10 years after commissioning as on **scheduled date of submission of technical bid** called upon by BHEL (i.e. proposed tender).

Requisite documents:

1. Performance certificate issued by end customer without any adverse remark(s), consisting the proof of experience of design, manufacture, supply and commissioning.

B) Financial PQR

Bidder should have a minimum average annual turnover/sales value of **INR 1500 Lakhs** for last three financial years (2020-21, 2021-22 & 2022-23) or (2019-20,2020-21 & 2021-22) .

- **In Case of Indian Bidder :-**

Audited Profit & Loss Account and Balance Sheet must be submitted as proof of Average Annual Turnover/Sales. The Financial statements must be signed by the owner/director and the auditor. Auditors seal, Name, Membership No., Firm Registration No. & firm name (if applicable), UDIN and the capacity in which he is signing (Proprietor/Partner), must be mentioned on the Profit & Loss A/c and Balance Sheet.

- **In case of Foreign Bidders :**

Figures of Turnover/Sales value as mentioned in reports from D & B (Dun and Brad Street) shall be considered acceptable by BHEL. Bidder to furnish BIR Report issued by D&B (Dun and Brad Street).

In case BIR reports issued for the above referred three financial years is not available, calendar years 2022, 2021 & 2020 or 2021, 2020 & 2019 may be considered acceptable.

Annexure- I

Enquiry no.:- 92G2400174 dated 15.09.2023

Item No.: 400kV XLPE Cable & Accessories (Supply+ Services)

Project: THDC Vishnugad Pipalkoti Hydro Electric Project (4X111 MW)

Prequalifying Requirement:-400kV XLPE Cable & Accessories

Note:-

(1) Bidder must submit all supporting documents along with their offer.

(2) All documents including third party documents/ supporting documents in language other than English, certified translated copy in English language shall also be furnished.

In case of Foreign bidder where turnover figures are in foreign currency, TT selling rate as applicable on 31.03.2023 as published by SBI, shall be applicable for arriving at equivalent to INR of 1500 Lakhs (i.e INR 150 Million) for purpose of computation of Turn over as mentioned in PQR.

Note:-

Offers will be scrutinized based on the qualifying requirements and only those who are technically and financially capable to execute the job and who fulfil the prequalifying requirements (PQR) are eligible to quote against above NIT. However, final acceptance of bidder /offer shall be subject to acceptance of our customer.

ACTIVITY SCHEDULE [ANNEXURE II]
A. For items except BOQ Item Sr No 1.10-1.13

Item :- 400 kV XLPE Cable & Accessories (Supply+ Services) for Vishnugad Pipalkoti

SL. NO.	ACTIVITY	TIME ALLOTED [IN WEEKS]*	SCOPE
1.	P.O Acceptance	1	IN SCOPE OF SUPPLIER
2.	Submission of documents necessary for getting manufacturing clearance (MFC) like Drawings, data sheet, QAP etc.	3	IN SCOPE OF SUPPLIER
3.	Review and Approval of documents from BHEL/Customer and issue of manufacturing clearance (MFC) lot wise as defined	4	IN SCOPE OF BHEL
4.	Manufacturing time for each lot after issuance of Manufacturing Clearance (MFC) by BHEL#	13	IN SCOPE OF SUPPLIER
5.	Inspection by BHEL/Customer/TPI	1	IN SCOPE OF BHEL
6.	Issue of Dispatch clearance	1	IN SCOPE OF BHEL
7.	Dispatch	6	IN SCOPE OF SUPPLIER
8.	Services (Other Than Type Tests)	10	IN SCOPE OF SUPPLIER

Inspection call to be raised 2 weeks in advance (4 weeks in case of foreign bidder) from the proposed date of inspection. In case 2/4 weeks (as applicable) of advance notice is not given for inspection call, the short period shall be considered as time attributable to vendor & delay shall be computed accordingly. Inspection call should be given in the prescribed format only. Inspection calls not in the prescribed format shall not be entertained.

1 Supplier must ensure the completeness and correctness of the requisite documents before submission for approval. Delay in approval on account of incomplete / inadequate information shall be the responsibility of supplier. Bidder to submit revised drawing and documents **within 1 week**s from the date of comments of BHEL/Customer. Delay in submission / resubmission of drawing documents beyond the stipulated time will be considered delay attributable to the vendor and shall be reduced from the time allowable to manufacture, Type Test.

2. Delay in each activity pertaining to BHEL not attributable to vendor as listed above shall be added (if required) in time extension case and will be re-fixed accordingly based on delay analysis.

SIGNATURE AND SEAL OF TENDERER

ACTIVITY SCHEDULE [ANNEXURE II]
For BOQ Item Sr No 1.10-1.13
Item :- 400 kV XLPE Cable & Accessories (Supply+ Services) for Vishnugad Pipalkoti

SL. NO.	ACTIVITY	TIME ALLOTED [IN WEEKS]**	SCOPE
1.	P.O Acceptance	1	IN SCOPE OF SUPPLIER
2.	Submission of documents necessary for getting manufacturing clearance (MFC) like Drawings, data sheet, QAP etc.	3	IN SCOPE OF SUPPLIER
3.	Issue of manufacturing clearance (MFC) from BHEL as per readiness of Site	12	IN SCOPE OF BHEL
4.	Manufacturing time for each lot after issuance of Manufacturing Clearance (MFC) by BHEL#	8	IN SCOPE OF SUPPLIER
5.	Inspection by BHEL/Customer/TPI	1	IN SCOPE OF BHEL
6.	Issue of Dispatch clearance	1	IN SCOPE OF BHEL
7.	Dispatch	3	IN SCOPE OF SUPPLIER
8.	Services (Other Than Type Tests)	10	IN SCOPE OF SUPPLIER

Inspection call to be raised 2 weeks in advance (4 weeks in case of foreign bidder) from the proposed date of inspection. In case 2/4 weeks (as applicable) of advance notice is not given for inspection call, the short period shall be considered as time attributable to vendor & delay shall be computed accordingly. Inspection call should be given in the prescribed format only. Inspection calls not in the prescribed format shall not be entertained.

1 Supplier must ensure the completeness and correctness of the requisite documents before submission for approval. Delay in approval on account of incomplete / inadequate information shall be the responsibility of supplier. Bidder to submit revised drawing and documents **within 1 week**s from the date of comments of BHEL/Customer. Delay in submission / resubmission of drawing documents beyond the stipulated time will be considered delay attributable to the vendor and shall be reduced from the time allowable to manufacture, Type Test.

2. Delay in each activity pertaining to BHEL not attributable to vendor as listed above shall be added (if required) in time extension case and will be re-fixed accordingly based on delay analysis.

SIGNATURE AND SEAL OF TENDERER

Check List for Supply bills (ANNEXURE III)

Name Of the Project							
Package Description							
Invoice No. & Date							
PO No. & date							
Sr. No	Documents Required	Copies	Check Points	Page no.	Vendor Remarks	Verification by MM	Verification by Fin
					(Y/N/NA)	(Y/N/NA)	(Y/N/NA)
1	Original for Buyer Invoice - GST compliant invoice	1 Original+2 Copy	1. Please ensure GST complaint invoice in original				
			2. Consignee address : BHEL C/o followed by site address				
			3. Item description and unit of quantity are matched with PO				
			4. Buyer address and GSTN No as required (TBG Noida or Nodal				
			5. PO No and date, LR No and date, Vehicle No and Project name are				
			6. Invoiced quantity are not more than th PO quantity and MICC				
			7. Ex works unit rate , Taxes and F&I rates are same as per PO				
			8. Signed and stamped by vendor				
2	Receipted LR (signed & stamped)/ confirmation from site regarding receipt of packages/ Boxes	1Orignal+2 Copy	1. Consignee address : BHEL C/o followed by Site address				
			2. In case of material purchased from sub vendor , Consignee address Vendor's name C/o BHEL C/o Site address				
			3. Vendor's Invoice no and Vehicle No are mentioned				
			4. No of boxes/No of packages are same as per Packing list				
			5. In case of and adverse remark on LR (Like shortages/damages/broken etc) , clarification from site/TBMM/TBCM is nedded				
			6. LR is readable				
			7. In case of photo copy, LR is verified by TBMM				
			8. LR date is after the date of MICC/(MDCC if issued) or same date				
3	Packing List - showing number of packages, and gross weight/net Weight (if applicable)	1Orignal+2 Copy	1. PO No and date, LR No and date, Invoice No and date, Site Name and address, Consignor and consignee address are mentioned				
			2. Item description and quantity are matched with Invoice and PO				
			3. Signed and stamped by vendor				
			4. No of packages/ Item descriptions are matched with MRC and LR				
4	MICC from BHEL	1Original+2Copy	1. BHEL MICC has been issued prior to the date of dispatch or on same date				
			2. In case where MICC date is after the date of dispatch then MDCC date is same or prior to the date of dispatch				
			3. Project Name, PO,Po Date, Vendor's name and address is correct				
			4. Item description, Quantity and unit of quantity are same as per PO				
			5. All hold point in MICC , if any, have been resolved before submission of bill				
			6. Signed and stamped by BHEL Executive				
			7. MICC and MDCC quantity are not less than Invoice quantity and cover all invoiced items.				
5	Guarantee Certificate	1 Original+2 Copy	1. Project Name, PO No., Invoice No , LR No and date are mentioned .				
			2. Guarantee Certificate is strictly matched with PO T&C				
			3. Signed and stamped by vendor				
6	Bank Guarantee	1 Copy	'1. Ensure submission of BG directly from Bank before supply of material so that BG confirmation may be arranged before processing				
			2. Bill can be processed only after receipt of BG confirmation directly from bank				
			3. It should be in the name of BHEL , TBG Noida with registered office address Siri Fort, New Delhi				
			4. It should be in prescribed format.				
			5. BG value and valdity plus claim period should be minimum as specified in PO / RC. Please check before supply , If BG extension is required please arrange the same				
			6. Vendor's name address should be same as per PO				
			7. Po No / RC No and date should be correct				
7	Insurance Certifcate	1 Orignal+2 Copy	1. Invoice No and date, Vendor's Name,Place from Consignor to Consignee are mentioned				
			2. It has not been issued later than the LR date				
			3. Insured value is not less than the Invoice value				
			4. Signed and stamped by Insurance Company				
			5. In case of Open Insurance Policy, declaration has been submitted to Insurance Company as per declaration clause of Open policy and				
			6. In case of any discrepancy , consent of TBCM is required for processing the bill and amount will be deducted for invalid Insurance				
8	PVC (If applicable) Invoice is submitted along with the Despatch Invoice	1Original+2Copy	PVC (If applicable) Invoice is submitted along with the Despatch Invoice				
			1. PVC invoice is attched along with supply Invoice				
			2. Calculation sheet and applicable PVC indices are also enclosed				
			3. If delay in delivery, then PVC indicies are as per PO conditions.				
9	Material receipt Certificate		1. LR No and date, Invoice No and date, Vehicle No and date , Site Name an address are mentioned				
			2. Date of receipt of material				
			3. Item description and quantity are same as per Invoice / Packing List				
			4. It is signed and stamped by Site executive				
			5. In case of any shortages / damages / adverse remark , clarification is needed				
10	Other Documents		To be seen as per specific requirement of PO.				

Annexure-IV

(A) CONCILIATION (MODEL CONCILIATION CLAUSE FOR CONDUCTING CONCILIATION PROCEEDINGS UNDER THE BHEL CONCILIATION SCHEME, 2018)

The Parties agree that if at any time (whether before, during or after the arbitral or judicial proceedings), any Disputes (which term shall mean and include any dispute, difference, question or disagreement arising in connection with construction, meaning, operation, effect, interpretation or breach of the agreement, contract or the Memorandum of Understanding (whichever is inapplicable), which the Parties are unable to settle mutually), arise inter-se the Parties, the same may, be referred by either party to Conciliation to be conducted through Independent Experts Committee to be appointed by competent authority of BHEL from the BHEL Panel of Conciliators.

Notes:

1. No serving or a retired employee of BHEL/Administrative Ministry of BHEL shall be included in the BHEL Panel of Conciliators.

2. Any other person(s) can be appointed as Conciliator(s) who is/are mutually agreeable to both the parties from outside the BHEL Panel of Conciliators.

The proceedings of Conciliation shall broadly be governed by Part-III of the Arbitration and Conciliation Act 1996 or any statutory modification thereof and as provided in **Annexure-A to this GCC (Enclosed).**

The Annexure-A together with it's appendices will be treated as if the same is part and parcel hereof and shall be as effectual as if set out herein in these GCC."

(B) ARBITRATION (WITH SOLE ARBITRATOR)

1.1. Except as provided elsewhere in this Contract, in case amicable settlement is not reached between the Parties, in respect of any dispute or difference; arising out of the formation, breach, termination, validity or execution of the Contract; or, the respective rights and liabilities of the Parties; or, in relation to interpretation of any provision of the Contract; or, in any manner touching upon the Contract, then, either Party may, by a notice in writing to the other Party refer such dispute or difference to the Sole Arbitrator and such Arbitrator appointed by Head of the BHEL Unit/Region/Division issuing the Contract.

1.2. The Arbitrator shall pass a reasoned award and the award of the Arbitrator shall be final and binding upon the Parties.

1.3. Subject as aforesaid, the provisions of Arbitration and Conciliation Act 1996 (India) and amended in 2015 and further amendment passed in 2019 or statutory modifications or re-enactments thereof and the rules made thereunder and for the time being in force shall apply to the arbitration proceedings under this clause. The seat of arbitration shall

be New Delhi. The language of arbitration shall be English and the documents shall be submitted in English.

1.4. The cost of arbitration shall initially be borne equally by the Parties subject to the final apportionment of the cost of the arbitration in the award of the Arbitrator.

1.5. Notwithstanding the existence or any dispute or differences and/or reference for the arbitration, the Contractor shall proceed with and continue without hindrance the performance of its obligations under this Contract with due diligence and expedition in a professional manner except where the Contract has been terminated by either Party in terms of this Contract.

1.6. **SETTLEMENT OF COMMERCIAL DISPUTES BETWEEN CPSES INTER SE AND CPSE(S) AND GOVERNMENT DEPARTMENT(S)/ ORGANISATION(S) – ADMINISTRATIVE MECHANISM FOR RESOLUTION OF CPSES DISPUTES (AMRCD) – REGARDING**

Vide Dept. of Public Enterprises OM No. F. No. 4(1)/2013-DPE(GM)/FTS-1835 dated 22.05.2018 it has been conveyed that *"To make the mechanism more effective and binding on the disputing parties, a new mechanism namely Administrative Mechanism for resolution of CPSEs Disputes (AMRCD) having two level (tier) structure has been evolved in consultation with various stakeholders to replace the existing PMA mechanism which stands wound up from the date of issue of this OM."* Accordingly, the existing Permanent Machinery of Arbitration (PMA) stands wound up with effect from 22.05.2018 and cases relating to disputes or differences relating to the interpretation and application of the provisions of commercial contract(s) between CPSEs / Port Trust / Central or State Government Department / Organisations (excluding disputes concerning Railways, Income Tax, Customs and Excise Departments) shall be taken up by either party for its resolution through Administrative Mechanism for Resolution of CPSEs Disputes (AMRCD).

(C) JURISDICTION AND GOVERNING LAWS

The Courts at New Delhi shall have exclusive jurisdiction over any matter arising out of or in connection with this Contract. This Contract shall be construed as per and be governed by the Laws of India.

ANNEXURE TO MODEL CONCILIATION CLAUSE FOR CONDUCT OF CONCILIATION UNDER THE BHEL CONCILIATION SCHEME, 2018

BRIEF PROCEDURE FOR CONDUCT OF CONCILIATION PROCEEDINGS

1. The proceedings of Conciliation shall broadly be governed by Part-III of the Arbitration and Conciliation Act 1996 or any statutory modification thereof and as provided herein:

2. The party desirous of resorting to Conciliation shall send an invitation/notice in writing to the other party to conciliate specifying all points of Disputes with details of the amount claimed. The party concerned shall not raise any new issue thereafter. Parties shall also not claim any interest on claims/counter-claims from the date of notice invoking Conciliation till the conclusion of the Conciliation proceedings.

3. The party receiving the invitation/notice for Conciliation shall within 30 days of receipt of the notice of Conciliation intimate its consent for Conciliation along with its counter-claims, if any.

4. The Conciliation in a matter involving claim or counter-claim (whichever is higher) up to Rs 5 crores shall be carried out by sole Conciliator nominated by BHEL while in a matter involving claim or counter-claim (whichever is higher) of more than Rs 5 crores Conciliation shall be carried out by 3 Conciliators nominated by BHEL.

5. The Parties shall be represented by only their duly authorized in-house executives/officers and neither Party shall be represented by a Lawyer.

6. The first meeting of the IEC shall be convened by the IEC by sending appropriate communication/notice to both the parties as soon as possible but not later than 30 days from the date of his/their appointment. The hearings in the Conciliation proceeding shall ordinarily be concluded within two (2) months and, in exceptional cases where parties have expressed willingness to settle the matter or there exists possibility of settlement in the matter, the proceedings may be extended by the IEC by a maximum of further 2 months with the consent of the Parties subject to cogent reasons being recorded in writing.

7. The IEC shall thereafter formulate recommendations for settlement of the Disputes supported by reasons at the earliest but in any case within

15 days from the date of conclusion of the last hearing. The recommendations so formulated along with the reasons shall be furnished by the IEC to both the Parties at the earliest but in any case within 1 month from the date of conclusion of the last hearing.

8. Response/modifications/suggestions of the Parties on the recommendations of the IEC are to be submitted to the IEC within time limit stipulated by the IEC but not more than 15 days from the date of receipt of the recommendations from the IEC.

9. In the event, upon consideration, further review of the recommendations is considered necessary, whether by BHEL or by the other Party, then, the matter can be remitted back to the IEC with request to reconsider the same in light of the issues projected by either/both the Parties and to submit its recommendations thereon within the following 15 days from the date of remitting of the case by either of the Parties.

10. Upon the recommendations by the Parties, with or without modifications, as considered necessary, the IEC shall be called upon to draw up the Draft Settlement Agreement in terms of the recommendations.

11. When a consensus can be arrived at between the parties only in regard to any one or some of the issues referred for Conciliation the draft Settlement Agreement shall be accordingly formulated in regard to the said Issue(s), and the said Settlement Agreement, if signed, by the parties, shall be valid only for the said issues. As regards the balance issues not settled, the parties may seek to resolve them further as per terms and conditions provided in the contract.

12. In case no settlement can be reached between the parties, the IEC shall by a written declaration, pronounce that the Conciliation between the parties has failed and is accordingly terminated.

13. Unless the Conciliation proceedings are terminated in terms of para 22 (b), (c) & (d) herein below, the IEC shall forward his/its recommendations as to possible terms of settlement within one (1) month from the date of last hearing. The date of first hearing of Conciliation shall be the starting date for calculating the period of 2 months.

14. In case of 3 members IEC, 2 members of IEC present will constitute a valid quorum for IEC and meeting can take place to proceed in the matter after seeking consent from the member who is not available. If necessary, videoconferencing may be arranged for facilitating participation of the members. However, the IEC recommendations will be signed by all members. Where there is more than one (1) Conciliator, as a general rule they shall act jointly. In the event of differences between the Members of IEC, the decision/recommendations of the majority of the Members of IEC shall prevail and be construed as the recommendation of the IEC.

15. The Draft Settlement Agreement prepared by the IEC in terms of the consensus arrived at during the Conciliation proceedings between the Parties shall be given by the IEC to both the parties for putting up for approval of their respective Competent Authority.

16. Before submitting the draft settlement agreement to BHEL's Competent Authority viz. the Board Level Committee on Alternative Dispute Resolution (BLCADR) for approval, concurrence of the other party's Competent Authority to the draft settlement agreement shall be obtained by the other party and informed to BHEL within 15 days of receipt of the final draft settlement agreement by it. Upon approval by the Competent Authority, the Settlement Agreement would thereafter be signed by the authorized representatives of both the Parties and authenticated by the members of the IEC.

17. In case the Draft Settlement Agreement is rejected by the Competent Authority of BHEL or the other Party, the Conciliation proceedings would stand terminated.

18. A Settlement Agreement shall contain a statement to the effect that each of the person(s) signing thereto (i) is fully authorized by the respective Party(ies) he/she represents, (ii) has fully understood the contents of the same and (iii) is signing on the same out of complete freewill and consent, without any pressure, undue influence.

19. The Settlement Agreement shall thereafter have the same legal status and effect as an arbitration award on agreed terms on the substance of the dispute rendered by an arbitral tribunal passed under section 30 of the Arbitration and Conciliation Act, 1996.

20. Acceptance of the Draft Settlement Agreement/recommendations of the Conciliator and/or signing of the Settlement Agreement by BHEL shall

however, be subject to withdrawal/closure of any arbitral and/or judicial proceedings initiated by the concerned Party in regard to such settled issues.

21. Unless otherwise provided for in the agreement, contract or the Memorandum of Understanding, as the case may be, in the event of likelihood of prolonged absence of the Conciliator or any member of IEC, for any reason/incapacity, the Competent Authority/Head of Unit/Division/Region/Business Group of BHEL may substitute the Conciliator or such member at any stage of the proceedings. Upon appointment of the substitute Conciliator(s), such reconstituted IEC may, with the consent of the Parties, proceed with further Conciliation into the matter either de-novo or from the stage already reached by the previous IEC before the substitution.

22. The proceedings of Conciliation under this Scheme may be terminated as follows:
    a. On the date of signing of the Settlement agreement by the Parties; or,
    b. By a written declaration of the IEC, after consultation with the parties, to the effect that further efforts at conciliation are no longer justified, on the date of the declaration; or,
    c. By a written declaration of the Parties addressed to the IEC to the effect that the Conciliation proceedings are terminated, on the date of the declaration; or,
    d. By a written declaration of a Party to the other Party and the IEC, if appointed, to the effect that the Conciliation proceedings are terminated, on the date of the declaration.
    e. On rejection of the Draft Settlement Agreement by the Competent Authority of BHEL or the other Party.

23. The Conciliator(s) shall be entitled to following fees and facilities:

Sl No	**Particulars**	**Amount**
1	Sitting fees	Each Member shall be paid a Lump Sum fee of Rs 75,000/- for the whole case payable in terms of paragraph No. 27 herein below.
2	Towards drafting of settlement agreement	In cases involving claim and/or counter-claim of up to Rs 5crores. Rs 50,000/- (Sole Conciliator)

Sl No	Particulars	Amount
		In cases involving claim and/or counter-claim of exceeding Rs 5 crores but less than Rs 10 crores. Rs 75,000 (per Conciliator) In cases involving claim and/or counter-claim of more than Rs 10 crores. Rs 1,00,000/- (per Conciliator) Note: The aforesaid fees for the drafting of the Settlement Agreement shall be paid on Signing of the Settlement Agreement after approval of the Competent Authority or Rejection of the proposed Settlement Agreement by the Competent Authority of BHEL.
3	Secretarial expenses	Rs 10,000/- (one time) for the whole case for Conciliation by a Sole Member IEC. Where Conciliation is by multi member Conciliators –Rs 30,000/- (one time)- to be paid to the IEC
4	Travel and transportation and stay at outstation i) Retired Senior Officials of other Public Sector Undertakings (pay scale wise equivalent to or more than E-8 level of BHEL)	As per entitlement of the equivalent officer (pay scale wise) in BHEL.
	Others	As per the extant entitlement of whole time Functional Directors in BHEL.

Sl No	Particulars	Amount
		Ordinarily, the IEC Member(s) would be entitled to travel by air Economy Class.
5	Venue for meeting	Unless otherwise agreed in the agreement, contract or the Memorandum of Understanding, as the case may be, the venue/seat of proceedings shall be the location of the concerned Unit / Division / Region / Business Group of BHEL. Without prejudice to the seat/venue of the Conciliation being at the location of concerned BHEL Unit / Division / Region / Business Group, the IEC after consulting the Parties may decide to hold the proceedings at any other place/venue to facilitate the proceedings. Unless, Parties agree to conduct Conciliation at BHEL premises, the venue is to be arranged by either Party alternately.

24. The parties will bear their own costs including cost of presenting their cases/evidence/witness(es)/expert(s)on their behalf. The parties agree to rely upon documentary evidence in support of their claims and not to bring any oral evidence in IEC proceedings.

25. If any witness(es) or expert(s) is/are, with the consent of the parties, called upon to appear at the instance of the IEC in connection with the matter, then, the costs towards such witness(es)/expert(s) shall be determined by the IEC with the consent of the Parties and the cost so determined shall be borne equally by the Parties.

26. The other expenditures/costs in connection with the Conciliation proceedings as well as the IEC's fees and expenses shall be shared by the Parties equally.

27. Out of the lump sum fees of Rs 75,000/- for Sitting Fees, 50% shall be payable after the first meeting of the IEC and the remaining 50% of the Sitting Fees shall be payable only after termination of the conciliation proceedings in terms of para 22 hereinabove.

28. The travelling, transportation and stay at outstation shall be arranged by concerned Unit as per entitlements as per Serial No. 3 of the Table at para 23 above, and in case such arrangements are not made by the BHEL Unit, the same shall be reimbursed to the IEC on actuals limited to their entitlement as per Serial No. 4 of the Table at Para 23 above against supporting documents. The IEC Member(s) shall submit necessary invoice for claiming the fees/reimbursements.

29. The Parties shall keep confidential all matters relating to the conciliation proceedings. Confidentiality shall extend also to the settlement agreement, except where its disclosure is necessary for purposes of its implementation and enforcement or as required by or under a law or as per directions of a Court/Governmental authority/ regulatory body, as the case may be.

30. The Parties shall not rely upon or introduce as evidence in any further arbitral or judicial proceedings, whether or not such proceedings relate to the Disputes that is the subject of the Conciliation proceedings:
    a. Views expressed or suggestions made by the other party in respect of a possible settlement of the Disputes;
    b. admissions made by the other party in the course of the Conciliator proceedings;
    c. proposals made by the Conciliator;
    d. The fact that the other Party had indicated his willingness to accept a proposal for settlement made by the Conciliator.

31. The Parties shall not present the Conciliator(s) as witness in any Alternative Dispute Resolution or Judicial proceedings in respect of a Disputes that is/was the subject of that particular Conciliation proceeding.

32. None of the Conciliators shall act as an arbitrator or as a representative or counsel of a Party in any arbitral or judicial proceeding in respect of a Disputes that is/was the subject of that particular Conciliation proceeding.

33. The Parties shall not initiate, during the Conciliation proceedings, any arbitral or judicial proceedings in respect of a Disputes that is the subject matter of the Conciliation proceedings except that a Party may initiate arbitral or judicial proceedings where, in his opinion, such proceedings are necessary for preserving his rights including for preventing expiry of period of limitation. Unless terminated as per the provisions of this Scheme, the Conciliation proceedings shall continue

notwithstanding the commencement of the arbitral or judicial proceedings and the arbitral or judicial proceedings shall be primarily for the purpose of preserving rights including preventing expiry of period of limitation.

34. The official language of Conciliation proceedings under this Scheme shall be English unless the Parties agree to some other language.

Format 2 to BHEL Conciliation Scheme, 2018

FORMAT FOR SEEKING CONSENT FOR REFERRING THE DISPUTES TO CONCILIATION THROUGH IEC

To,

M/s. (Stakeholder's name)

Sub: Resolution of the Disputes through conciliation by Independent Expert Committee (IEC).

Ref: Contract No/MoU/Agreement/LOI/LOA& date _____.

Sir,

With reference to above referred Contract/MoU/Agreement/LOI/LOA, you have raised certain Disputes/claims. Vide your letter dated____ you have requested BHEL to refer the Disputes/claims to IEC for Conciliation.

We are enclosing herewith Format (3) for giving consent and the terms and conditions of BHEL Conciliation Scheme, 2018 governing conciliation through IEC. You are requested to give your unconditional consent to the said terms and conditions of the Scheme by returning the same duly sealed and signed on each page. On receipt of your consent, matter will be put to the Competent Authority for consideration and decision.

Please note that BHEL has also certain claims against you (if applicable). BHEL reserves its right to agree or not to agree conciliation of the said disputes through BHEL and this letter is being issued without prejudice to BHEL's rights and contentions available under the contract and law.

Yours faithfully,

Representative of BHEL

Format 3 to BHEL Conciliation Scheme, 2018

FORMAT FOR GIVING CONSENT BY CONTRACTOR/VENDOR/CUSTOMER/COLLABORATOR/CONSORTIUM PARTNERSFOR REFERRING THE DISPUTES TO CONCILIATION THROUGH IEC

To,

BHEL

.....

Sub: Resolution of Disputes through Conciliation by Independent Expert Committee (IEC).

Ref: Contract/MoU/Agreement/LOI/LOA No & date____

With reference to above referred contract, our following bills/invoices/claims submitted to BHEL are still unpaid giving rise to Disputes:

SL. no.	Claim Description	Bill submitted to BHEL (no. and date)	Amount of the bill/claim	Amount received from BHEL	Outstanding Amount

Accordingly we request you to kindly refer the Disputes in respect of above claims to IEC for Conciliation.

We hereby agree and give our unconditional consent to the terms and conditions of BHEL Conciliation Scheme, 2018 governing conciliation through IEC. We have signed the same on each page and enclosed it for your consideration.

Yours faithfully,

(Signature with stamp)

Authorized Representative of Contractor
Name, with designation
Date

Format 5 to BHEL Conciliation Scheme, 2018

STATEMENT OF CLAIMS/COUNTER CLAIMS TO BE SUBMITTED TO THE IEC BY BOTH THE PARTIES

1. Chronology of the Disputes

2. Brief of the Contract/MoU/Agreement/LOI/LOA

3. Brief history of the Disputes:

4. Issues:

5. Details of Clam(s)/Counter Claim(s):

Sl. No.	**Description of claim(s)/Counter Claim**	**Amount (in INR)Or currency applicable in the contract**	**Relevant contract clause**

6. Basis/Ground of claim(s)/counter claim(s) (along with relevant clause of contract)

Note– *The Statement of Claims/Counter Claims may ideally be restricted to maximum limit of 20 pages. Relevant documents may be compiled and submitted along with the statement of Claims/Counter Claims. The statement of Claims/Counter Claims is to be submitted to all IEC members and to the other party by post as well as by email.*

Annexure-V

Item/Package Name :	**400kV XLPE Cable & Accessories (Supply+ Services)**
Enquiry No.:	**92G2400174 dated 15.09.2023**
Project:	**THDC Vishnugad Pipalkoti Hydro Electric Project (4X111 MW)**
Percentage of Local Content	***(Bidder to enter the applicable % of local content)***

Self-certification to be submitted in INR 100/- non judicial stamp paper

Format of Self certification regarding Local Content in line with PPP-MII order, 2017 & its revision dated 04.06.2020.

Date:……

I _____S/o, D/o, W/o, _____Resident of _____ hereby solemnly affirm and declare as under:

That I will agree to abide by the terms and conditions of the Public Procurement (Preference to Make in India) Order, 2017 (*hereinafter PPP-MII order*) of Government of India issued vide Notification No: P-45021/2/2017-BE-II dated 15/06/2017, its revision dated 04/06/2020 and any subsequent modifications/Amendments**,** if any**.**

That the information furnished hereinafter is correct to the best of my knowledge and belief and I undertake to produce relevant records before the procuring entity/BHEL or any other Government authority for the purpose of assessing the local content of goods/services/works supplied by me for …… *(Enter the name of the Equipment/Item for Project).*

That the local content for all inputs which constitute the said goods/services/works has been verified by me and I am responsible for the correctness of the claims made therein.

That the goods/services/works supplied by me for …… (Enter the name of the Equipment/Item for Project) contains…….% (mention the Local content in %age) Local Content.

That the value addition for the purpose of meeting the 'Minimum Local Content 'has been made by me at …… (*Enter the details of the location(s) at which value addition is made)*.

That in the event of the local content of the goods/services/works mentioned herein is found to be incorrect and not meeting the prescribed supplier class categorization criteria as per said order, based on the assessment of procuring agency (ies)/BHEL/Government Authorities for the purpose of assessing the local content, action shall be taken against me in line with the PPP-MII order and provisions of the Integrity pact/ Bidding Documents.

Annexure-V - Continue

Item/Package Name :	**400kV XLPE Cable & Accessories (Supply+ Services)**
Enquiry No.:	***92G2400174 dated 15.09.2023***
Project:	**THDC Vishnugad Pipalkoti Hydro Electric Project (4X111 MW)**
Percentage of Local Content	***(Bidder to enter the applicable % of local content)***

I agree to maintain the following information in the Company's record for a period of 8 years and shall make this available for verification to any statutory authority.

i. Name and details of the Local Supplier
(Registered Office, Manufacturing unit location, nature of legal entity)

ii. Date on which this certificate is issued

iii. Goods/services/works for which the certificate is produced

iv. Procuring entity to whom the certificate is furnished

v. Percentage of local content claimed and whether it meets the Minimum Local Content prescribed

vi. Name and contact details of the unit of the Local Supplier (s)

vii. Sale Price of the product

viii. Ex-Factory Price of the product

ix. Freight, insurance and handling

x. Total Bill of Material

xi List and total cost value of input used to manufacture the Goods/to provide services/in construction of works

xii. List and total cost of input which are domestically sourced. Value addition certificates from suppliers, if the input is not in-house to be attached

xiii. List and cost of inputs which are imported, directly or indirectly

For and on behalf of…… (Name of firm/entity)

Authorized signatory (To be duly authorized by the Board of Directors)
<Insert Name, Designation and Contact No.>

Annexure-V - Continue

Item/Package Name :	**400kV XLPE Cable & Accessories (Supply+ Services)**
Enquiry No.:	***92G2400174 dated 15.09.2023***
Project:	**THDC Vishnugad Pipalkoti Hydro Electric Project (4X111 MW)**
Percentage of Local Content	***(Bidder to enter the applicable % of local content)***

Certificate from statutory auditor or cost auditor of the company (in the case of companies) or from a practicing cost accountant or practicing chartered accountant (in respect of suppliers other than companies) giving the percentage of Local Content, in line with PPP-MII order, if applicable ***[to be submitted on the letter head of the issuer.]***

Dear Sir,

We have read and understood the provisions of "Public Procurement (Preference to Make in India) Order, 2017" dated 15/06/2017, its revision dated 28/05/2018 and any subsequent modifications/Amendments, if any [hereinafter, "PPP-MII Order"] issued by Department of Industrial Policy and Promotion (DIPP), Ministry of Commerce and Industry, Government of India.

In line with the provisions of the PPP-MII Order, M/s. ……*[Enter the name of the Bidder] [*hereinafter, "Local Supplier"*]* have submitted an Affidavit of self-certification to M/s. Bharat Heavy Electricals Limited [hereinafter, BHEL] regarding Local Content in Goods/Services/Works to be supplied by the Local Supplier for …… *(Enter the name of the Equipment/Item for Project).]*, wherein they have agreed to abide by the terms and conditions of the PPP-MII Order.

Further, in line with the PPP-MII Order, the statutory auditor or cost auditor of the company (in the case of companies) or a practicing cost accountant or practicing chartered accountant (in respect of suppliers other than companies) shall provide a certificate giving the percentage of Local Content in the Goods/Service/Works to be supplied by the Local Supplier for …… *(Enter the name of the Equipment/Item for Project).*

Accordingly, we, the Statutory Auditor(s) / Cost auditor (*applicable in the case of companies*) of the Local Supplier / a practicing cost accountant or practicing chartered accountant (*applicable in respect of suppliers other than companies*), certify that the Local Content as defined under the PPP-MII, in the Goods/Service/Works to be supplied by the Local Supplier for …… *(Enter the name of the Equipment/Item for Project).* is …….. percentage [*specify the percentage of Local content*].

For and on behalf of, Date:

<<Statutory Auditor's/ Cost auditor's/ Cost accountant's/ Chartered accountant's attestation>>

Firm Reg No. Membership No.

Note: This is a guiding format. In case the bidder submits the certificate in a format different from the above, the same may be considered provided it meets the intent and purpose, as may be ascertained by BHEL.

Annexure-VI

Clause regarding regarding restrictions under Rule 144 (XI) of the General Financial Rules (GFRs), 2017 as per Government of India order OM No.6/18/2019-PPD dated 23.07.2020

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.

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 failing 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 Order 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 entitles 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 shareholder's 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 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.

Annexure-VI

Clause regarding regarding restrictions under Rule 144 (XI) of the General Financial Rules (GFRs), 2017 as per Government of India order OM No.6/18/2019-PPD dated 23.07.2020

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.

***** *The above clause is not applicable to the bidders from those countries (even if* sharing a land border with India) to which the GoI has extended lines of credit or in which the GoI is engaged in development projects.

* List of countries to which lines of credit have been extended or in which development projects are undertaken are available on the Ministry of External affaires website (https://www.mea.gov.in/)

Annexure-VII

Compliance to be submitted in INR 100/- non judicial stamp paper

Sub: **Compliance to Government of India order OM No.6/18/2019-PPD dated 23.07.2020 regarding restrictions under Rule 144 (XI) of the General Financial Rules (GFRs), 2017**

Sl No.	Description	Bidder's confirmation
1	*We, M/s_____have read the clause regarding restrictions on procurement from a bidder of a country which shares a land border with India; We hereby certify that we are not from such a country.*	*Agreed*

(Note: Non-compliance of above said GoI Order and its subsequent amendment, (if any), by any bidder(s) shall lead for commercial rejection of their bids by BHEL)

Bidder's authorized signatory with stamp & seal

Annexure-VIII

Compliance to be submitted in INR 100/- non judicial stamp paper

Sub: **Compliance to Government of India order OM No.6/18/2019-PPD dated 23.07.2020 regarding restrictions under Rule 144 (XI) of the General Financial Rules (GFRs), 2017**

Sl No.	Description	Bidder's confirmation
1	*We, M/s_____have read the clause regarding restrictions on procurement from a bidder of a country which shares a land border with India. We are from such a country which shares a land border with India & have been registered with the Competent Authority as specified in above said order. We hereby certify that we fulfil all requirements in this regard and are eligible to be considered.* ***Evidence of valid registration by the Competent Authority is attached.***	*Agreed*

(Note: Non-compliance of above said GoI Order and its subsequent amendment, (if any), by any bidder(s) shall lead for commercial rejection of their bids by BHEL)

Bidder's authorized signatory with stamp & seal

Annexure-IX

No.25-111612018-PG

Government of India

Ministry of Power

Shram Shakti Bhawan, Rafi Marg, New Delhi • — 110001

Tele Fax: 011-23730264

Dated 02/07/2020

ORDER

Power Supply System is a sensitive and critical infrastructure that supports not only our national defence, vital emergency services including health, disaster response, critical national infrastructure including classified data & communication services, defence installations and manufacturing establishments, logistics services but also the entire economy and the day-today life of the citizens of the country. Any danger or threat to Power Supply System can have catastrophic effects and has the potential to cripple the entire country. Therefore, the Power Sector is a strategic and critical sector.

The vulnerabilities in the Power Supply System & Network mainly arise out of the possibilities of cyber attacks through malware / Trojans etc. embedded in imported equipment. Hence, to protect the security, integrity and reliability of the strategically important and critical Power Supply System & Network in the country, the following directions are hereby issued:-

1. All equipment, components, and parts imported for use in the Power Supply System and Network shall be tested in the country to check for any kind of embedded malware/trojans/cyber threat and for adherence to Indian Standards.
2. All such testings shall be done in certified laboratories that will be designated by the Ministry of Power (MOP).
3. Any import of equipment/components/parts from "prior reference" countries as specified or by persons owned by, controlled by, or subject to the jurisdiction or the directions of these "prior reference" countries will require prior permission of the Government of India
4. Where the equipment/components/parts are imported from "prior reference" countries, with special permission, the protocol for testing in certified and designated laboratories shall be approved by the Ministry of Power (MOP).

This order shall apply to any item imported for end use or to be used as a component, or as a part in manufacturing, assembling of any equipment or to be used in power supply system or any activity directly or indirectly related to power supply system.

This issues with the approval of Hon'ble Minister of State for Power and New & Renewable Energy (Independent Charge).

(Goutam Ghosh)

Director Tel: 011-23716674 To:

1. All Ministries/Departments of Government of India (As per list)
2. Secretary (Coordination),Cabinet Secretariat
3. Vice Chairman, NITI Aayog

सेवा भवन, आर. के. पुरम-I, नई दिल्ली-110066 टेली: 011-26732257 ईमेल: ce-rndcea@nic.in वेबसाइट: www.cea.nic.in

Sewa Bhawan, R.K Puram-I, New Delhi - 110066 Tele: 011-26732257 Email: ce-rndcea@nic.in Website: www.cea.nic.in

Annexure-X

Vendor Compliance format in bidder letter head

In view of by order No. 25-111612018-PG, Dated 02.07.2020 of Ministry of Power, GOI

Enquiry No/ PO No & Date **: 92G2400174 dated 15.09.2023**
Project **: THDC Vishnugad Pipalkoti Hydro Electric Project (4X111 MW)**
Name of items/Package **: Supply of 400 kV XLPE Cable & Accessories (Supply+ Services)**

This is to certify that all equipment, components, and parts imported for use in the Power Supply System and Network are in strict compliance to directions issued by Ministry of Power, Govt. of India vide order No. 25-111612018-PG dated 02.07.2020. The imported component(s), part or assembly item(s) does not carry any malware/Trojan etc.

Note: Non-compliance of MoP Order and its subsequent amendment(s), (if any), by vendor shall lead to rejection of their offer or cancellation of contract, which is awarded by BHEL.

Bidder's authorized signatory

with stamp & seal

Annexure-XI

1. **Integrity Pact (IP):**
Bidder shall have to enter into Integrity Pact with BHEL , Duly signed with seal in original, if specified in NIT/RFQ failing which bidder's offer shall be liable for rejection.

(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	Phone & E- mail
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 the 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 e-mail 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):-

1) Name:- Sunil Kumar Department :- TBG, Material Management Address:- BHEL/ TBG, Noida Phone:- 01206748471 E mail:- Sunil.kumar@bhel.in	2) Name:- Piyush Kumar Mishra Department :- TBG, Material Management Address:- BHEL/ TBG, Noida Phone:- 01206748575 E mail:- piyush.kumar@bhel.in

Annexure-1

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 _____

_____
_____ (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)/ Cotractor (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 Prinicpal 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.

tr Mishra P.K. MISHRA MANAGER (TBMM)

For & On behalf of the Principal
(Office Seal)

BHARAT HEAVY ELECTRICALS LIMITED Industry Sector Noida-U

Place Noida
Date 02.02.2023

Witness: Ankit Gupta
(Name & Address) Ankit Gupta BHEL TBG

For & On behalf of the Bidder/ Contractor
(Office Seal)

Witness:_____
(Name & Address) _____
_____

Annexure- II

RISK PURCHASE

1.1. In case the Supplier / Contractor fails to supply or fails to comply with terms & conditions of the Purchase Order / Contract or delivers equipment / material not of the contracted quality or fails to adhere to the contract specifications or fails to perform as per the activity schedule and there are sufficient reasons even before expiry of the delivery / completion period to justify that supplies shall be inordinately delayed beyond contractual delivery / completion period, BHEL reserve the right to cancel the Purchase Order / Contract either in whole or in part thereof without compensation to Supplier / Contractor and if BHEL so desires, may procure such equipment / material / items not delivered [redacted] in such manner as deemed appropriate, at the risk and cost of the Supplier / Contractor and the Supplier / Contractor shall be liable to BHEL for any excess cost to BHEL. However, the Supplier / Contractor shall continue execution of the Purchase Order / Contract to the extent not cancelled under the provisions of this clause.

1.2. Risk & Cost Clause, in line with Conditions of Contract may be invoked in any of the following cases:

i) Contractor/ supplier's poor progress of the work vis-à-vis execution timeline as stipulated in the Contract, backlog attributable to contractor/ supplier including unexecuted portion of work/ supply does not appear to be executable within balance available period considering its performance of execution.

ii) Withdrawal from or abandonment of the work by contractor/supplier before completion as per contract.

iii) Non completion of work/ Non-supply by the Contractor/ supplier within scheduled completion/delivery period as per Contract or as extended from time to time, for the reasons attributable to the contractor/ supplier.

iv) Termination of Contract on account of any other reason(s) attributable to Contractor/ Supplier.

v) Assignment, transfer, subletting of Contract without BHEL's written permission resulting in termination of Contract or part thereof by BHEL.

vi) Non-compliance to any contractual condition or any other default attributable to Contractor/ Supplier.

1.3. Risk and Cost amount against Balance Work:

In case Risk & Cost is invoked, the amount of Risk & Cost against balance work shall be calculated as under:

Risk & Cost Amount (A-B) (A x H/100)

Where,

A= Value of Balance scope of Work/ Supply (*) as per rates of new contract

B= Value of Balance scope of Works/ Supply (*) as per rates of old contract being paid to the contractor/ supplier at the time of termination of contract i.e. inclusive of PVC & ORC, if any.

H = Overhead Factor to be taken as 5 (five)

In case (A-B) is less than 0 (ero), value of (A-B) shall be taken as 0 (ero).

(Balance scope of work/ supply)

Difference of Contract Quantities and Executed Quantities as on the date of issue of Letter for 'Termination of Contract', shall be taken as balance scope of Work / Supply for calculating risk & cost amount.

Contract quantities are the quantities as per original contract. If, Contract has been amended, quantities as per amended Contract shall be considered as Contract Quantities.

Items for which total quantities to be executed have exceeded the Contract Quantities based on drawings issued to contractor from time to time till issue of Termination letter, then for these items total Quantities as per issued drawings would be deemed to be contract quantities.

Substitute/ extra items whose rates have already been approved would form part of contract quantities for this purpose. Substitute/ extra items which have been executed but rates have not been approved, would also form part of contract quantities for this purpose and rates of such items shall be determined in line with contractual provisions.

However, increase in quantities on account of additional scope in new tender shall not be considered for this purpose.

NOTE: Incase portion of work is being withdrawn, contract uantities pertaining to portion of work withdrawn shall be considered as 'Balance scope of work/supply' for calculating Risk & Cost amount.

1.4. LD against delay in executed work/supply in case of Termination of Contract

LD against delay in executed Work /Supply shall be calculated in line with LD clause of the contract for the delay attributable to contractor/ supplier. For this purpose, contract value shall be taken as Executed Value of work/supply for the purpose of limiting maximum LD value.

Method for calculation of "LD against delay in executed Work/ supply" is given below:

i) Let the time period from scheduled date of start of work till termination of contract excluding the period of Hold (if any) not attributable to contractor/ supplier= T1

ii) Let the value of executed work/ supply till the time of termination of contract= X

iii) Let the Total Executable Value of work/ supply for which inputs/fronts were made available to contractor/ supplier and were planned for execution till termination of contract = Y

iv) Delay in executed work/ supply attributable to contractor/supplier i.e. $T2=(1-\frac{X}{Y})x\ T1$

v) LD shall be calculated in line with LD clause of the Contract for the delay attributable to contractor/ supplier taking "X" as Contract Value and "T2" as delay attributable to contractor/ supplier.

Note: In case portion of service/ supply is withdrawn, no LD shall be applicable for portion of service/ supply withdrawn.

1.5. Recovery from Supplier

Recoveries from contractor/ supplier on whom risk & cost has been invoked shall be as per Clause No. 23 of GTC.

Annexure-XIII

THDCIL

CORPORATE QUALITY ASSURANCE
MAIN CONTRACTOR'S PROPOSAL CUM EVALUATION REPORT

Ref No:				Date:					
i.	Main Contractor								
ii.	Project				Contract Reference				
iii.	Package Name			Package No					
iv.	Proposed Item/Scope of Sub-contracting								
v.	Item covered under	Offshore/Schedule-1		As per contract clause No-					
		Onshore/Schedule-2							
vi.	If item is Schedule-1 and proposed sub-vendor is indigenous, Main Contractor to explain how the contractual provisions will be fulfilled								
vii.	Name and Address of the proposed Sub-vendor's works								
viii.	Whether the sub-vendor evaluated by BHEL, comply the THDC contract conditions in respect to technical specification requirements , Capability/experience etc. for works as referred at per S.no.-iv above.	Yes/ No Details of evaluation attached at **Annexure. –A** (if yes)							
ix	Whether the sub-vendor is already approved by BHEL for above referred item/equipment . If yes please provide the following and attached the same as annexure-B :	Yes/ No Details attached at **Annexure. –B** (if yes)							
ix-1	Date of approval								
ix-2	Details of items /equipment								
ix-3	Name of project for which approval is given								
ix-4	Present ranking of the sub -vendor given by BHEL								
ix-5	Provide details as per **Sl.No. -xi**								
ix-6	Whether BHEL has evaluate the bidder through visit/review	Visit/review							
x	Contract No./PO placement date/ Start of manufacturing (if self-manufactured) as per L2 network				Applicable / Not applicable				
x-1	S.no.	Item Description (Type/Size/Rating/ Scope of Sub-Contracting)	Total quantity of proposed item envisaged in this package (Nos/ Running Meters/ Kgs/ Tons etc)	Quantity proposed to be procured from proposed sub-vendor (Nos/ Running Meters /Kgs /Tons etc)	Timeline for quantity requirements as per project schedule & whether the proposed Sub-vendor equipped with adequate capacity to supply proposed order quantity in time				
xi.	Work experience of the proposed sub-vendor (including supplies to Main Contractor, if any) for similar item/equipment scope of sub-contracting, for last 3 years (Note:- **Only relevant experience details w.r.t. proposed work /scope of subcontracting** to be brought out here) :Product satisfactory performance feedback letter/certificates/End User Feedback								
	S.No.	Name of work (Only relevant experience details w.r.t. proposed work as mention at s.n.iv)	Customer Name	Supplied Item (Type/Rating/Model /Capacity/Size etc)	Contract /PO no/date	Supplied Quantity	Date of commissioning	Year of operation	Details of Reference/ feed back /successful completion certificate from end customer , and copy of the same attached at Annexure-C

We confirm that as per our assessment, the proposed sub-vendor has requisite capabilities & work experience and is suitable for execution of the proposed work/scope of sub-contracting.

Name:		Desig:		Sign:		Date:	

Company's Seal/Stamp:-

THDCIL

CORPORATE QUALITY ASSURANCE
SUB-VENDOR QUESTIONNAIRE

i.	Item/Scope of Sub-contracting			
ii.	Address of the registered office	Details of Contact Person (Name, Designation, Mobile, Email)		
iii.	Name and Address of the proposed Sub-vendor's works where item is being manufactured	Details of Contact Person (Name, Designation, Mobile, Email)		
iv.	Annual Production Capacity for proposed item/scope of sub-contracting			
v.	Annual production for last 3 financial years for proposed item/scope of sub-contracting			
vi.	**Details of sub-vendor's works**			
1	Year of establishment of present works			
2	Year of commencement of manufacturing at above works			
3	Details of change in Works address in past (if any)			
4	Total Area			
	Covered Area			
5	Factory Registration Certificate	Details attached at Annexure –1		
6	Design/ Research & development set-up (No. of manpower, their qualification, machines & tools employed etc.)	Applicable / Not applicable if manufacturing is as per Main Contractor/purchaser design) Details attached at Annexure – 2 (if applicable)		
7	Overall organization Chart with Manpower Details (Design/Manufacturing/Quality etc.)	Details attached at Annexure – 3		
8	After sales service set up in India, in case of foreign sub-vendor (Location, Contact Person, Contact details etc.)	Applicable / Not applicable Details attached at Annexure – 4		
9.1	Manufacturing process execution plan with flow chart indicating various stages of manufacturing from raw material to finished product including outsourced process, if any	Details attached at Annexure – 5		
9.2	If the manufacturing /processes is being done out side of works , details of same shall be submitted separately	Details attached at Annexure – 5.1		
10	Sources of Raw Material/Major Bought Out Item	Details attached at Annexure – 6		
11.1	Quality procedure availability/implementation	Details attached at Annexure – 7.1		
11.2	Quality Control exercised during receipt of raw material/BOI, in-process , Final Testing, packing	Details attached at Annexure – 7.2		

THDCIL

CORPORATE QUALITY ASSURANCE
SUB-VENDOR QUESTIONNAIRE

12	Manufacturing facilities (List of machines, special process facilities, material handling etc.)	Details attached at Annexure –8
13.1	Testing facilities (List of testing equipment)	Details attached at Annexure – 9
13.2	If the in-house testing facility is not available , indicate source of testing with relevant details	Details attached at Annexure – 9.1
14	If manufacturing process involves fabrication then-	Applicable / Not applicable Details attached at Annexure – 10 (if applicable)
	List of qualified Welders	
	List of qualified NDT personnel with area of specialization	
15	List of out-sourced manufacturing processes with Sub-Vendors' names & addresses	Applicable / Not applicable Details attached at Annexure. – 11 (if applicable)
16	Work reference list, including recent executed works **(Note:- Only relevant experience details w.r.t. proposed item/scope of work)**	Details attached at Annexure – 12 (as per format given below)

S.No.	Details of work	Customer Name	Supplied Item (Type/Rating/Model /Capacity/Size etc)	Contract/PO ref no/date	Supplied Quantity	Date of commissioning of work

17	Work satisfactory performance feedback letter/certificates/End User Feedback	Attached at annexure - 13
18	Summary of Type Test Report (Type Test Details, Report No, Agency, Date of testing) for the proposed product (similar or higher rating) Note:- Reports need not to be submitted	Applicable / Not applicable Details attached at Annexure – 14
19	Statutory / mandatory certification for the proposed work/product	Applicable / Not applicable Details attached at Annexure –15 (if applicable)
20	Copy of ISO 9001 certificate (if available)	Attached at Annexure – 16
21	Product technical catalogues for proposed item (if available)	Details attached at Annexure – 17

NAME:		Desig:		Sign:		Date:	

Annexure- XIV

HSE CONDITIONS

at a GLANCE (for bidders)

Health Safety and Environment Management

Transmission Business Group, Noida

DOCUMENT CONTROL			
Document number:	TBG/HSE/NIT-01		
Issue number:	00	Issue date:	08.01.2020
Revision number:	01	Revision date :	22.10.2021

	Prepared by	Checked by	Approved and Issued for use by
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Date	22.10.2021	22.10.2021	22.10.2021

Doc. copy issue no. :		Doc. copy issue date :	
Issued to :	Name	Designation	Signature
Issued by :	Name	Designation	Signature

BHARAT HEAVY ELECTRICALS LIMITED

TRANSMISSION BUSINESS GROUP

BHEL TBG through its long experience and policy, has developed a culture to consider wellbeing of the society, protection of environment and occupational health and safety of its workers first. TBG has also a culture of transparency in all its business activities. In line to this culture, this NIT annexure is prepared as a peeping window in to the TBG HSE requirements which need to be 100% complied by the successful bidders while executing the contract. Interested bidders should go through these HSE conditions:

1. BHEL HSE Policy

In BHEL, Health, Safety and Environment (HSE) responsibilities are driven by our commitment to protect our employees and people we work with, community and environment. BHEL believes in zero tolerance for unsafe work/non-conformance to safety and in minimizing environmental footprint associated with all its business activities. We commit to continually improve our HSE performance by:

- Developing safety and sustainability culture through active leadership and by ensuring availability of required resources.
- Ensuring compliance with applicable legislation, regulations and BHEL systems.
- Taking up activities for conservation of resources and adopting sound waste management by following Reduce/Recycle/Reuse approach.
- Continually identifying, assessing and managing environmental impacts and Occupational Health & Safety risks of all activities, products and services adopting approach based on elimination/ substitution/reduction/control.
- Incorporating appropriate Occupational Health, Safety and Environment criteria into business decisions, design of products & systems and for selection of plants, technologies and services.
- Imparting appropriate structured training to all persons at workplace and promoting awareness amongst customers, contractors and suppliers on HSE issues.
- Reviewing periodically this policy and HSE Management Systems to ensure its relevance, appropriateness and effectiveness.
- Communicating this policy within BHEL and making it available to interested parties.

Atul Sobti
Chairman & Managing Director

June 5, 2018

Creating BHEL of tomorrow

2. Legal Compliances:

a. Statutory Provisions: All the sub-contractors are to comply with client specific rules and procedures, the National legislations and codes, in particular the following or their revised versions:

Srl. No	Acts/Rules Name	Srl. No	Acts/Rules Name
1	The Factories Act 1948, Amendment Act 1947	11	Contractor labour Act, 1970 (Regulation and abolition)
2	The Environment Act 1986	12	Provident fund Act, 1952
3	Workmen's Compensation Act, 1923	13	Payment of gratuity Act, 1972
4	Building and Other Construction Workers (Regulation of employment and condition of service) Act, 1996	14	Indian Explosives Act and the explosives Rules 2008
5	Buildings and Other Construction Workers Welfare Act, 1996	15	The Gas Cylinder Rules, 2016, Static and Mobile Pressure Vessels (Unfired) Rules 2016
6	Payment of wages Act, 2017 Equal remuneration Act,	16	The Indian Electricity Act 2003 and Indian Electricity Rules 2005
7	Minimum wages Act.1948	17	The Atomic Energy Act, 2015
8	Employers liability Act, 1938	18	The atomic energy (Radiation Protection) Rules. 2004
9	Industrial dispute Act, 1947	19	National Fire Protection Association (NFPA),
10	maternity benefit amendment act 2017	20	National Building Code of India 2016 etc.

b. Indian Standard (IS) Codes related to HSE

All the sub-contractors are to comply with client specific rules and procedures, the National legislations and codes in particular the following or their revised versions:

Srl	IS Code	Applies on
1	IS: 4081 -1986	Safety code for Blasting and Related Drilling operations
2	IS: 3764 -1992	Safety code for excavation work
3	IS: 5121 -1969	Safety code for pilling and other deep foundations

4	IS: 2750 -1964	Specification for steel scaffoldings
5	IS: 3696 (Part-I)-1987	Safety code for scaffolds and Ladders: Part- I Scaffolds
6	IS: 3696 (Part-II) -1991	Safety code for scaffolds and Ladders: Part –II Ladders
7	IS: 4082 -1977	Recommendations on stacking and storage of construction materials at site (First revision)
8	IS: 4130-1976	Safety code for demolition of building (First revision)
9	IS: 4912-1978	Safety requirements for floor and wall openings, railings and toe boards (First revision)
10	IS: 5916- 1970	Safety code for constructions involving use of hot bituminous materials
11	IS: 7205 -1974	Safety code for erection of structural steel work
12	IS: 7969 -1975	Safety code for handling and storage of building materials
13	IS: 8989 -1978	Safety code for erection of concrete framed structures
14	IS: 7293 -1974	Safety code for working with construction machinery
15	IS: 2212 -1991	Pipe lines –Identification –Colour code
16	IS: 5216 -1982	Recommendations on safety procedures &practices in Electrical works (Part -I &II)
17	IS: 875 -1964	Code of practice for structural safety of buildings and loading standards
18	IS: 10386 -1983	General aspects Part-1 -1983, Part-2 -1982, Part-6 -1983, Part-10 -1983- Amenities, Protective clothing and equipment, construction, storage, handling, detection and Safety measures for gases, chemicals and flammable liquids
19	IS: 10500-2012	Drinking water (Specification)
20	IS: 10291 -1982	Code of dress in civil engineering works
21	IS: 2925-1984	Safety helmets
22	IS: 1179-1967	Welding helmets
23	IS: 7524 -1979 (Part-I)	Safety goggles
24	IS: 9167 -1979	Ear muff /Ear plugs
25	IS: 6994 -1973 (Part-I)	Canvas hand gloves, Cotton hand gloves, Chrome leather gloves
26	IS: 4770 -1991	Rubber hand gloves tested for 15,000 volts
27	IS: 3521 -1999	Full body safety harness
28	IS: 11057 -1984	Specification for Industrial safety nets
29	IS: 13415 -1992	Protective Barriers in & around buildings (Code of safety)

30	IS: 13416 -1992	Preventive measures against Hazards at work places-Recommendations part-I Falling materials hazards Prevention part-I
31	IS: 13416 -1992	Preventive measures against Hazards at work places-Recommendations part-II Fall Prevention
32	IS: 15298 -2011 (Part 1&2)	Personal Protective Equipment -Safety shoes
33	IS: 12254 -1993	Poly vinyl chloride (PVC) industrial boots
34	IS: 5557:2004	Industrial and Protective Rubber knee and Ankle boots
35	IS: 2878 -2004	Co2 Type fire extinguisher
36	IS: 2171 -1999	Dry chemical powder fire extinguisher
37	IS: 13849 – 1993	Fire extinguisher for ABC fires
38	IS: 10204-2001	Mechanical Foam type extinguisher (Foam used shall conform to IS: 4989 -1974 and Co2 cartridge shall conform to IS: 4947 -1985)
39	IS: 3786 -1983	Methods for computation of Frequency rate and Severity rates for Industrial injuries and classification of Industrial accidents (First revision)

c. The Sub-contractors need to

- Attend HSE familiarization program at TBG-HQ with his site management team. This will be a half day long awareness session on HSE requirements and compliances which the agency is supposed to fulfil during contract execution at site. The session shall be taken by TBG HSE department on intimation by TBSM.
- Request for issuance of Form-V in their name from customer on behalf of BHEL
- Get the Labour license registration from concerned Labour office.
- Get the BOCW Registration done along with the labour license.
- Get their labourers registered under BOCW for benefits provided by the office.
- Maintain Seven registers of labours as per BOCW requirement.
- Ensure payment of wages to labours not less than the current minimum wages applicable in the premises.
- Ensure PF deduction of labourers and submission of proof to BHEL office (Wage sheet, ECR & Challan copies) duly signed.
- Submit Labour Payment Certificate by 10th of Every month.
- File timely returns, get renewals done and submit a copy to BHEL office.

- Get Workmen's Compensation policy before the start of work, covering all the labourers and staff,
  - Policy should clearly mention the project name and location,
  - should be as per labour class and wage.
  - Should cover all the height workers with clear mention of Max. height.
  - Policy should be submitted to BHEL office and renewal before expiry.
- Issue employment card to every worker.

3. Labour Welfare and Medical Facilities

a. Labour Welfare

1. Declaration of normal working hours and weekly off day, Payment day & intervals
2. Paid rest days & holidays.
3. Payment of overtime @ twice the normal wage rate.
4. No labour shall be allowed overtime >12 hrs/week, limited to 48 hrs/month.
5. Rest and lunch area.
6. Separate Male/Female Toilets and Lavatories, clearly marked in local Language and provided with signage.
7. Cold and clean drinking water facility suitable to strength and near workplace
8. Creche for children of female workers as per BOCW requirements
9. Arranging labour accommodation in hygienic environment with the facilities of Water (Drinking, Sanitation), washing and bathing area, toilets in sufficient nos., clean and safe camps and surrounding, access road, well illuminated camp and roads, mode of contact, transport facility, first aid centre, 24x7 Security etc.
10. Cooking and eating place to be maintained in hygienic condition
11. General awareness of health and hygiene.

b. Medical facilities and Health centres

- Availability of first aid box at every work location and agency office, with contents as per BOCW requirement.
- Emergency vehicle (four wheeler) at work place
- Availability of stretchers in emergency vehicle and in office.
- Trained first aider
- Medical check-up for all the supervisors and workers including cooks, at the time of induction and annually thereafter.
- Tetanus Vaccination for all in every six months.
- Identification and tie-up with nearby reputed hospital(s) and display of their contact number in Emergency contact list.

4. House Keeping & Storage

Housekeeping is a continuous process and is the part of work. Agencies shall maintain safe and presentable housekeeping all the time in their respective areas, common work locations and passage areas. Roads, passages, staircases, entrance/exit gates shall always be maintained obstruction free. No material shall be left or stacked at the roof edges. Agency shall make arrangements to remove scraps on regular basis and dispose them at a space provided by customer, clearly fenced and marked by the sub-contractor as **"SCRAP YARD"**. Suitable arrangement like dedicated housekeeping team and tractor/hydra should be identified for this work.

Construction materials like shuttering materials, staging materials, cables, re-bars, cements bags, earthing flats and rods, FF pipes, surplus soil etc should be stored/stacked properly such that it should neither pose threat to safety of man nor should obstruct the free movement of man and machineries.

Every sub-contractor should have separate and well maintained storage area for his own materials, T&Ps, PPEs and BHEL issued materials. Consumables like diesel, cotton, grease, oil, paint, admixtures and other fire potential materials should be stored separately with suitable firefighting facility.

Fire capacity of store area to be assessed and accordingly fire extinguishers shall be planned suiting the class and capacity of fire. Sand heaps may also be stacked in open store yards suitably to use in case of fires.

5. Site Safety

a. Induction and others safety trainings

Every sub-contractor shall make arrangement to provide induction training as per BHEL and/or customer requirement on a pre-approved and fixed module to all its new inductees irrespective of class or grade of appointment/hire. He shall also arrange the required facilities for induction training such as board, marker, dummy, posters/banners with all the mandatory PPEs.
Sub-contractor shall also arrange for periodic trainings on fire-fighting, first aid, CPR, importance and use of PPEs, electrical safety, hot work safety, Height work safety, confined space, deep excavations and barricading, concreting work safety etc.

b. Appointment of Safety Officer/Supervisor

Every sub-contractor shall appoint at least one full time qualified safety officer having qualification and experience as specified in Schedule-VIII of BOCW Act-1996. He shall not be assigned any duty/work other than assisting in upliftment of safety practices. He shall perform his duties in accordance with the requirements of Schedule-VIII of BOCW-1996. He shall ensure daily TBT, induction training, health check-up and other such compliances as per HSEP-14 on regular basis. In case of non-appointment, agency shall be penalized as per provisions in clause no. 7.0 of HSEP-14 (HSE Plan for Site Operations (subcontractors))

c. Safety organisation, Safety committees and meetings

Safety officer shall report directly to the head of the projects of the sub-contractor management. There shall be some appointed or nominated safety stewards from each sub-group like shuttering, bar-bending, concreting, brick work, material handling, structure erection, cable laying, pipe work, maintenance, batching plant, housekeeping etc.

A safety committee shall be formed including members from different agencies, BHEL and customer covering at-least 50% participation from workers. Safety committee shall meet on weekly basis or as may be decided by customer, outcomes shall be complied as committed.

d. Personal Protective E uipments.

Unless mentioned otherwise, there will be three mandatory PPEs- Safety shoes, Safety Helmet and Reflective jackets conforming to relevant IS codes as mentioned above.
Every person entering in the project premises shall use above mandatory PPEs.
There will be other PPEs too based on the work requirement like:
Twin lanyard full body harness, fall arresters and life lines for height workers,
Face shield for welders and grinders, Induction helmets and Electrical resistant shoes with FRP/PVC toe for electricians and commissioning engineers, Gum boots for concrete workers and manual excavators, Goggle for gas cutters and grinders, Aprons for welders, shoulder pads for material handlers, Hand gloves – Leather for binders/welders/grinders, certified Rubber gloves

for electricians, PVC for concrete/cement handlers, cotton-housekeeping team/brick coolies/erectors, cable laying men and other material handlers. Dust mask for cement handlers.

e. Material Handling

BHEL as a policy discourages continuous manual handling. Material handling contributes a major portion in the project and hence proper means (mechanical/ electrical powered) should be deployed appropriately for this work. Cranes/Faranas/hydras should not be used for material transportation for long distances(>100m), if such movement is un-avoidable, it must be accompanied by a trained signal man. Long materials should be guided by tagline. Roads for material movement should be free from obstructions. Lifting appliances must be in good condition and must have test/inspection certificates.
Lifting tackles like- D-shackles, chains, ropes, slings, belts shall be periodically inspected and shall have valid test certificate and/or third party inspection certificates.
Painted/galvanized structures/materials to be lifted by adequate capacity nylon belts only.
If a machine undergoes a major maintenance, fresh TPI shall be required before use. Hydraulic/pneumatic machines shall be free from leakages. Daily checklist to be filled and witnessed by the concerned supervisor before start of the work.

f. Vehicle/Machinery Documents and other safety re uirements

- Crawler mounted boom cranes/Tyre mounted telescopic cranes/tower cranes
  1. Valid third party inspection certificate.
  2. Valid Insurance policy
  3. Registration Certificate (if applicable)
  4. Valid Pollution under control (PUC) (if applicable)
  5. Fitness certificate from RTO (if applicable)
  6. Operator's valid license, experience and/or competence certificate.
  7. Swing horn
  8. Reverse horn
  9. Boom aviation light
  10. Approved Load chart (inside cabin)
  11. Fire extinguisher (inside cabin)
  12. First aid kit (inside cabin)
  13. Boom angle indicator
  14. Hook Latch
  15. Reflector strips on around cabin and on boom

- Loader backhoe (JCB), crawler excavators (Poclain), Hydra,
  1. Valid third party inspection certificate.
  2. Valid Insurance policy
  3. Registration Certificate (if applicable)
  4. Valid Pollution under control (PUC) (if applicable)

5. Fitness certificate from RTO (if applicable)
6. Operator's valid commercial license, experience and/or competence certificate.
7. Reverse horn
8. Approved Load chart (inside cabin) (Hydra)
9. Fire extinguisher (inside cabin)
10. First aid kit (inside cabin)
11. Hook Latch (Hydra)
12. Reflector strips on around cabin and on boom

- Tipper, Transit mixtures (TM), Self-loading concrete mixture (Ajax Fiori), Tractors
    1. Valid third party inspection certificate.
    2. Valid Insurance policy
    3. Registration Certificate
    4. Valid Pollution under control (PUC)
    5. Fitness certificate from RTO
    6. Operator's valid commercial Heavy license, experience and/or competence certificate.
    7. Reverse horn
    8. Fire extinguisher (inside cabin)
    9. First aid kit (inside cabin)
    10. Reflector strips on around cabin and on body

Note: 1. Tractors may be allowed with Light Commercial/non-commercial license on customer's consent.

- Cars, Taxis, scooters, motor cycles and other public carriers
    - Valid 2/4 wheeler license (as applicable- commercial/non-commercial)
    - Registration Challan
    - Valid Insurance
    - Pollution under control

g. Man-lifts (Cherry pickers), Scissors Lifts

1. Trained operator with experience/competence certificate and license
2. Valid third party inspection certificate.
3. Valid Insurance policy
4. Registration Certificate (if applicable)
5. Valid Pollution under control (PUC) (if applicable)
6. Swing horn
7. Reverse horn
8. Boom aviation light
9. Fire extinguisher (inside cabin)
10. First aid kit (inside cabin)
11. Reflector strips on around cabin and on boom

Note:

1. No one shall ride man-lift bucket without safety belt, safety shoes, helmet and reflective jacket.
2. Not more than 3 persons at a time will board in bucket of man-lift (without any heavy materials) including operator.
3. Operator will not leave the machine while persons are elevated and working.
4. No one other than the authorised operator will operate the man lifts/Scissors lifts.

h. Excavation

Prior permission/clearance from customer is a must for excavations in areas where underground service services such as gas/water/oil/chemical/electrical lines may be routed. Due precautions shall be taken during excavation in such area. Excavations near water bodies (ponds/canals etc.) shall be done with sand/soil bags ready to plug water from accidental damaged/burst of edges. All the excavations shall be done by either step cutting (min. 600mm step at every 1.5m depth) or slope cutting at 1:2(X:Y axis) (or greater depending upon the soil condition). Where step cutting/slope cutting is not possible due to space constraints, shoring/shuttering or sheet piling to be used to check collapse of soil.

Excavated soil shall be stacked away from edge of the pit, at-least 1.5 meters or half of the depth whichever is higher. Height of the stack shall not exceed 2m in height.

Ramps shall be provided for access of the workers in large pits and ladder of metal/good built for small pits. Ladders shall be of sufficient length protruding at least 1m above the ground level.

Pumps of adequate capacity shall be available for pumping out of water. No lone worker shall be allowed to work in any excavation. Overloaded vehicle shall not be allowed near excavated pits.

i. Bar bending and Binding

Bar bending machine shall be installed under shed/roof. It shall be properly earthed and maintained for operation. Housekeeping of the area shall be team's responsibility on daily basis. All be bar benders shall be given hand gloves (leather/cotton) in addition to mandatory PPEs. Scrap shall be segregated and moved to scrap yard on regular basis. Bar bending station shall be located away from Main plying roads/passages. The station shall be well illuminated, shall have a maintained first aid kit and potable water. Station shall be located in such a way that the movement of the material be minimised.

. Concreting

No electric vibrators shall be allowed to use. All the concrete workers shall be issued gum boots, safety helmets, reflective jackets and PVC hand gloves. Free fall of concrete from chute shall not exceed 1m in height. Heavy machineries/ vehicles shall be kept at least 2m away from the edge. Emergency vehicle shall be available near concreting work. Late night works shall be avoided, if it is unavoidable, a prior permission from BHEL/Customer is mandatory.

k. Welding, Gas Cutting & other hot works

Welding: Only experienced welders should be deployed for welding jobs. Welders shall be provided with apron, hand gloves, arm pads, leg pads, face shield and safety shoes. Welding leads shall be joint less and insulated. Power input point shall be fully covered at machine.

Gas cutting: If LPG is being used, domestic cylinder is strictly prohibited inside the project premises, (not allowed for site kitchen too). Hose pipes shall be in good condition without cracks, cuts, punctures or joints. Ends should be clamped with worm clamps. Dial gauges shall be of good quality and duly calibrated. Flash back arresters is a must for both oxygen/acetylene or LPG/Oxygen combination. Cylinders shall be stored, transported and used in vertical position only. When not in use, they shall be capped. Empty and filled cylinders to be stored separately with distinct marking.
Cylinders shall neither be rolled on the ground nor thrown during loading/unloading.

Grinding: Grinder shall be given clear glass face shield, apron, safety shoes, ear muffs and hand gloves. Grinder machines shall have wheel guard. Plug tops to be used for power connection preferably three wire type. Only trained persons shall be allowed to use grinders, abrasive cutters. Electrical connection shall be free from cuts, joints etc.

l. Erection & Height Work

Only trained filters and experienced helpers shall be engaged in erection work. Step bolts of lattice towers shall be checked for full tightness with spring washers before use. Height pass shall be issued to the identified group of erectors who have passed medical test and have working experience at height. Name of such workers shall be displayed at appropriate place. These workers only shall be allowed to work at height. Height work shall not be permitted in high wind/bad weather condition, during raining or in night/dark.

m. Electrical Safety

BHEL usually provided single point power source and sub-contractors draw power from there. Otherwise agencies make their own arrangement for construction power like DG sets etc. Sub-contractors shall submit their load requirement (amperage & phase) to BHEL before start of work. Accordingly, they shall make arrangements to draw power and distribution arrangements too in a safe way. MCCBs and HRC fuses to be put in circuit for short circuit and overload protections and RCCBs of 30mA sensitivity to be put at each distribution panel for human safety. Earthing pits shall be installed at each distribution point and maintained below three Ohm resistivity which shall be inspected randomly. The distribution points shall be clean, free from vegetation and water logging, easily accessible and covered/protected from three sides and top for rain. Earthing of DBs shall be done by 25x3mm GI flats connected from proper earth pits. Insulation mat, PVC Sheet/Wooden plank to be placed before DBs as platform. DB Sheds shall be legibly marked with name of agency, contact no of electrician and SLD of that DB. Only industrial plugs and sockets shall be allowed. Three wire (Phase, neutral and earth) system shall be used for tools, lights and machineries and two wire power draw shall be strictly prohibited. PTW and LOTO system shall be maintained to work on LT system. Name and contact no of authorised electricians who will be responsible of electrical power facility maintenance shall be submitted to BHEL by Agencies. Unauthorised sharing of power from one agency to other is strictly prohibited. Electricians shall use standard PPEs and insulated tools only. Standard and tested/certified discharge rods to be used in the areas where there is a possibility

of residual current or induction charge. The induction rod to be connected to the earth first and removed in the last. Induction helmets only to be used in the charged area. Electricians to be provided with electrical resistant safety shoes having FRP/PVC toe.

n. Dust Gases and fumes

Sub-contractor shall make arrangements to avoid accumulation of dust fumes and gases. Cement handlers inside store or at batching plant and gravel spreader shall be given effective nose masks and jaggery (at least 200g per person per day). DG sets and other machineries like cranes excavators etc. shall have valid and effective PUC certificate and shall have maintained engine with silencer. No IC engine operated machine shall be used in confined and covered area like hall, sheds, store etc. where accumulation due to lack of ventilation can increase to harmful levels. Dedicated arrangements (tanker or tractor with sprinkler) shall be made by the sub-contractors (individual or jointly) to continuously subside the dusts arising out of the movement of the vehicles roads/passages. Welding activities near roof accumulates harmful gases. Welders in such positions shall be provided with effective masks conforming to IS standards.

o. Vehicular Traffic

Speed limits defined within the premises shall strictly be followed by the drivers/commuters of construction as well as other vehicles.
Every construction machinery, man-lift shall display the name, contact no and passport size photograph of the authorised operator (There can be one or more authorised operators).
No one other than operator and co-operator shall sit inside the cabin of any construction machine while it is working.
Construction machineries (tractor, trucks, tippers, JCBs, hydra, Fassi cranes etc. shall never be used as mode of public transport. Machineries like Ajax Fiori and hydra shall not be driven in back direction except for small distances. No overloaded vehicle shall be permitted entry in the project premises.
Over speeding shall be reported and driver/operator shall be barred from entry or shall be penalised.
Drunken drivers shall be barred from entry in the project.
Carrying harmful weapons like knives (>6”), guns etc. shall permanently disqualify the person from entry in project premises.

p. Barricading and floor openings

Every pit deeper than 4 feet (1.2m) shall be barricaded immediately after excavation and will remain barricaded till backfilling.

Pits/trenches drains near roads, passages whether temporary or permanent shall be hard barricaded and well illuminated. Roof edges and openings shall be strictly hard barricaded and illuminated. Height works like masonry works, structure erection, erection by cranes, Lattice tower/beam erection areas shall be barricaded to restrict entry. Areas under charging/commissioning shall be barricaded and caution boards shall be displayed on newly charged areas.

. Scaffold & Ladder

No bamboo/wooden scaffold shall be allowed to be used. Only tubular steel scaffolds with couplers conforming to the relevant IS codes shall be allowed with base plates. Standard steel or wooden planks to be used as platforms and no packing materials shall be used. All the platforms shall be built with provisions of **top rail at 1m height, mid rail at 0.5m height and toe boards of min 6" height** at floor level. Minimum width of platform shall be 900mm and if wheel barrow is to be used then 1200mm. Means of access to be provided in the form of ladders, ramps or staircase. Multilevel work platforms or those platforms having passage underneath shall be provided with safety net, screen or canopy at each level for protection from falling objects. Platforms shall be free from concrete, debris or other materials. Platforms shall not extend out of the putlogs and shall be secured and fastened. Decking shall be made non-skidding.
Scaffolds under erection shall be tagged **"RED"**, under repair/maintenance/inspection shall be tagged **"YELLOW"** and ready for use shall be tagged **"GREEN"**

Only metal ladders in the construction site and FRP ladders in charged areas shall be allowed. Ladders made from packing materials shall not be used. Ladders shall be securely fixed at bottom, top and long ladders at middle points too at an interval not more than 2400mm and must have a landing at every 6m. Inclination angle should be approximately 1:4 (X:Y) or 75deg. Ladder must extend at least 1m above the platform/access area. Gap between two rungs shall not exceed 300mm. Portable ladder should not be more than 4m in length. Minimum width of the ladder shall not be less than 300mm.

Use of Mobile aluminium scaffold is preferably advisable for erection of transformers/reactors.

r. Illumination

The sub-contractor shall ensure that the areas such as work stations, buildings, batching plants, passages/roads, stores, rest areas, power sources, staircases etc. are illuminated sufficiently to make safe work conditions at site and shall not be less than the relevant IS standards. Excavations/ below ground level structures near passages/roads shall also be sufficiently illuminated.

s. Safety banners/posters, caution boards

Sub-contractors shall display boards and banners in sufficient quantity having safety signs, slogans, important messages, pictures, cautions at prominent locations to promote safety and spread awareness for important precautions such as "Deep Excavation Ahead", Speed Limit", "Charged Area", "Do not operate", "Hard hat area", "No smoking Zone" etc. Boards containing messages of Emergency contacts, First aid facility, rates of minimum wages, working hours, rest day etc. should be displayed at specific areas.

t. Waste management and disposal

Sub-contractor shall make suitable and effective arrangement to remove waste material from site on regular basis and store them in an identified and safe location. Disposal of wastes shall also be done as per manufacturer's instructions or as per the guidelines laid by legal authorities. Re-bars, Cement bags, packing material (wooden/metal/plastic/paper), paint, oil, grease, cables (armour, sheathing, insulation), civil debris, metal chips, GI sheet scraps, batteries etc. are the common waste materials. Sub-contractor

shall arrange disposal of the hazardous wastes/materials in conformance to the legal and contractual requirements only.

u. Inspection of PPEs, T&Ps, Machineries and lifting appliances

All the PPEs, T&P and lifting appliances purchased newly by sub-contractors shall have test certificates which shall be submitted to BHEL office periodically or on demand. There shall be at least monthly joint inspection schedule for inspection of healthiness of all the PPEs, T&Ps and lifting appliances. All the lifting appliances shall be tested and examined by a competent person before taking into use for the first time or after it has undergone any alterations or repairs liable to affect its strength or stability

and also once at least in every twelve months. To confirm quality of the PPEs as per the relevant IS codes, BHEL may ask sub-contractors to get any or all types of PPEs tested through NABL approved lab as per relevant IS codes. At any stage, the 100% cost of such tests shall be in the scope of respective sub-contractors.

v. Cable Laying

Sub-contractor shall ensure cable trenches free from water, mud, debris, snakes, Scorpios, lizards before start of the work in trenches. Cable drum rollers shall be used to pull cables out of drums to avoid twisting of cables. Hand gloves, Safety shoes/gum boots, reflective jackets, safety helmets shall be provided to the workers. Cable laying area shall be well illuminated.

w. Fire Protection

Every sub-contractor has to maintain their working area, store and office area free from bushes. Stacking of flammable materials like wood, paper, plastic, paint, oil, grease, fuel, cotton, gases etc. at isolated place disconnected from other storage and office areas. Adequate arrangements of firefighting means like suitable extinguishers, fire/water buckets, water tanks, sand dunes etc. shall be made by the agency depending upon the fire capacity assessed or as per MSDS. Fire drills and trainings on how to operate fire extinguishers and how to react in case of fire breakouts shall be the part of regular training program. Guards and store persons must be a regular participant of such training programs. A list of trained firefighting persons and periodicity of such training programs shall be submitted to BHEL by every agency and same to be adhered. Sufficient number of fire extinguishers with suitable class shall be placed at such locations where there can be fire hazard like stores, pantry, office, DG set, electrical distribution panels etc.

x. Fencing of exposed rotating parts

Exposed rotating parts poses great threat to the person in vicinity. Such parts need to be fenced/covered. Guards are mandatory of grinders, abrasive cutters. Flywheels of the engines of heavy machines, Diesel engines, DG sets need to be covered. Electric winch machines, pulleys, chains, shafts, exhaust fans at reachable height, table fans, need to be caged/fenced. Such fencing/guard shall not be removed while machinery is in operation.

y. Emergency preparedness response plan and periodic mock drills.

Sub-contractor shall comply JSA (Job Safety Analysis) and arrange to mitigate the effects of identified possible hazards. He shall also define following in response to emergency preparedness:
An emergency assembly point and put a board of the same with information to all in induction training.
Have facility of ambulance or tie-up with nearest hospital for service in minimum possible time (Max-30min) if there is not ambulance inside the premises.
Ensure availability of emergency vehicle with driver all the time at site during work.
Conduct mock-drills on possible risks like electrocution, fall from height, fire, heat stroke etc., record responses and take photographs to submit in BHEL office. Stretchers availability in emergency vehicle or at work place should be well accessible. Provide fire extinguishers of right type at right place in right quantity with information to all. Display emergency contact nos. to various risk locations and at office, service building or at major work locations. Provide first aid training by doctors for and display names of such trained first aiders and fire fighters. Rescue kit with trained staff or man lift or both to rescue a man hanging by safety belt at height. Provide running water tap near chemical storage and handling points. Agencies shall follow emergency response plan prepared by BHEL in each area of work, store and office.

. Safety reports & Reporting of accidents

BHEL will provide ''formats and checklists'' for the purpose of records/documents pertaining to the compliance of aforesaid clauses. Agencies shall be responsible for strict adherence and compliance for timely generation and fill-up of the checklists and reports. These shall be submitted on weekly and monthly basis as specified in the formats.

Agency shall also promote such an environment that the near misses, incidents and accidents are reported by every person, whosoever witnesses them. These shall help in analysing the trend and taking measures in reducing/stopping the accidents/incidents. Initial reporting can be in any form-by call, SMS, WhatsApp, e-mail, letter etc.
Major and fatal accidents or high potential incidents shall be investigated for route cause and outcomes shall be immediately implemented to check recurrences.

6. General conditions and penalty clauses

Following are the general conditions:

PPEs shall not only bear the ISI mark but also be conforming to the required standards, 100% compliance of the PPEs is mandatory.
Over speeding of vehicles shall attract penalty/notice and recurrence will attract debarring from entry into project premises.
Hiding of facts like incidents, accidents, fake/forged reports/certificates shall also attract penalty/ notice or both. Only approved third party agencies shall be allowed to inspect the machines, T&Ps. Reports shall directly be sent to BHEL/customers by the third parties.
Insurance and TPIs to be renewed before expiry. Machines, T&Ps shall not be allowed to work if renewal delayed. Continuity of WC policy to be maintained religiously by the respective agencies.

Agency shall submit the status report of his labour license, BOCW registration, WC Policy, insurance & TPI validity on monthly basis with list of machineries and T&Ps

Sub-contractors shall also maintain a buffer stock of all the PPEs in at least 20% excess to the present strength of the work force.

If construction power is not drawn as per the guidelines laid in clause no. 5(m), given above, BHEL may take-up this work at the risk and cost of the agency and/or may withhold a sum of min. Rs. 50,000/- (Rs. Fifty Thousand) or more as the site in-charge deems fit till the system is aligned as per aforesaid requirement.

Agencies shall be responsible for the compliance of the above requirements. Failure in one or more clauses/area shall attract a notice or monitory penalty or a combination of above.

Monitory penalty will be

- Rs. 1000/- per person/incident per day for non-conformity in above areas.
- A Major/severe accident shall attract a penalty of Rs. 2,00,000/- per head
- Fatality or permanent disability with total loss of earning capacity, if any, will attract a penalty of Rs. 5,00,000/- (Rs. Five Lakh).
- Further fatality/permanent disability shall attract double the last penalty imposed on the agency.
- Above penalties are exclusive of medical expenses of the victim or compensation to the family through insurance policy (WC Policy or group insurance).
- **Penalties imposed by customer shall be fully transferable to the sub-contractor. In the event of above cases, penalties shall be imposed whichever will be higher.**
- Evaluation of agency's performance on HSE compliance shall be done as per BHEL guide lines/system.

Revision History

Revision Date	Revision No.	Old Text	New Text	Reason	Revised by (with sign)
03.05.2019	00	N/A	Full Document	New Release	
12.10.2021	01	Nil	Attend HSE familiarization program at TBG-HQ with his site management team. This will be a half day long awareness session on HSE requirements and compliances which the agency is supposed to fulfil during contract execution at site. The session shall be taken by TBG HSE department on intimation by TBSM. (at page no. 4)	For better understanding of HSE requirements to agency. (HSE Review meeting dated 23.08.2021)	
12.10.2021	01	Edition	Inclusion of penalty provisions in case of non-deployment of safety person(page-7)	Introduction of HSEP-14	

-:End of Document:-

BANK GUARANTEE FOR PERFORMANCE SECURITY

Bank Guarantee No:

Date:

To

NAME

& ADDRESSES OF THE BENEFICIARY

Dear Sirs,

In consideration of the Bharat Heavy Electricals Limited [1] (hereinafter referred to as the 'Employer' which expression shall unless repugnant to the context or meaning thereof, include its successors and permitted assigns) incorporated under the Companies Act, 1956 and having its registered office at BHEL House Siri Fort New Delhi-110049 through its Unit at BHEL, TBG, Noida having awarded to (Name of the Vendor / Contractor / Supplier) having its registered office at_____[2] hereinafter referred to as the 'Contractor/Supplier', which expression shall unless repugnant to the context or meaning thereof, include its successors and permitted assigns), a contract Ref No PO No……dated ……..[3] valued at Rs……[4] (Rupees ----------)/FC……(in words……..) for ……[5] (hereinafter called the 'Contract') and the Contractor having agreed to provide a Contract Performance Guarantee, equivalent to ……% (…. Percent) of the said value of the Contract to the Employer for the faithful performance of the Contract,

we, ……., (hereinafter referred to as the Bank), having registered/Head office at ……. and inter alia a branch at ……. being the Guarantor under this Guarantee, hereby, irrevocably and unconditionally undertake to forthwith and immediately pay to the Employer a maximum amount Rs ---------- (Rupees ----------) without any demur, immediately on a demand from the Employer, .
Any such demand made on the Bank shall be conclusive as regards the amount due and payable by the Bank under this guarantee. However, our liability under this guarantee shall be restricted to an amount not exceeding Rs. _____ _____.

We undertake to pay to the Employer any money so demanded notwithstanding any dispute or disputes raised by the Contractor/ Supplier in any suit or proceeding pending before any Court or Tribunal relating thereto our liability under this present being absolute and unequivocal.

The payment so made by us under this Guarantee shall be a valid discharge of our liability for payment thereunder and the contractors/supplier shall have no claim against us for making such payment.

We the ……bank further agree that the guarantee herein contained shall remain in full force and effect during the period that would be taken for the performance of the said Contract and that it shall continue to be enforceable till all the dues of the Employer under or by virtue of the said Contract have been fully paid and its claims satisfied or discharged.

We …….. BANK further agree with the Employer that the Employer shall have the fullest liberty without our consent and without affecting in any manner our obligations hereunder to vary any of the terms and conditions of the said Contract or to extend time of performance by the said Contractor/Supplier from time to time or to postpone for any time or from time to time any of the powers exercisable by the Employer against the said Contractor/Supplier and to forbear or enforce any of the terms and conditions relating to the said Agreement and we shall not be relieved from our liability by reason of any such variation, or extension being granted to the said Contractor/Supplier or for any forbearance, act or omission on the part of the Employer or any indulgence by the Employer to the said Contractor/Supplier or by any such matter or thing whatsoever which under the law relating to sureties would but for this provision have effect of so relieving us.

The Bank also agrees that the Employer at its option shall be entitled to enforce this Guarantee against the Bank as a principal debtor, in the first instance without proceeding against the Contractor and notwithstanding any security or other guarantee that the Employer may have in relation to the Contractor's liabilities.

This Guarantee shall remain in force upto and including…….. [6] and shall be extended from time to time for such period as may be desired by Employer.
This Guarantee shall not be determined or affected by liquidation or winding up, dissolution or change of constitution or insolvency of the Contractor/Supplier but shall in all respects and for all purposes be binding and operative until payment of all money payable to the Employer in terms thereof.

Unless a demand or claim under this guarantee is made on us in writing on or before the ……..[7]we shall be discharged from all liabilities under this guarantee thereafter.

We ……. BANK lastly undertake not to revoke this guarantee during its currency except with the previous consent of the Employer in writing.
Notwithstanding anything to the contrary contained hereinabove:

a) The liability of the Bank under this Guarantee shall not exceed…….. [8]
b) This Guarantee shall be valid up to ……..[9]
c) Unless the Bank is served a written claim or demand on or before _____[10] all rights under this guarantee shall be forfeited and the Bank shall be relieved and discharged from all liabilities under this guarantee irrespective of whether or not the original bank guarantee is returned to the Bank.

We, _____ Bank, have power to issue this Guarantee under law and the undersigned as a duly authorized person has full powers to sign this Guarantee on behalf of the Bank.

For and on behalf of
(Name of the Bank)

Dated……..

Place of Issue……..

[1] *NAME AND ADDRESS OF EMPLOYER I.e Bharat Heavy Electricals Limited*

[2] *NAME AND ADDRESS OF THE VENDOR /CONTRACTOR / SUPPLIER.*

[3] *DETAILS ABOUT THE NOTICE OF AWARD/CONTRACT REFERENCE*

[4] *PROJECT/SUPPLY DETAILS*

[5] *BG AMOUNT IN FIGURES AND WORDS*

[6] *VALIDITY DATE*

[7] *DATE OF EXPIRY OF CLAIM PERIOD*

[8] *BG AMOUNT IN FIGURES AND WORDS.*

[9] *VALIDITY DATE*

[10] *DATE OF EXPIRY OF CLAIM PERIOD*

Note:

1. **Units are advised that expiry of claim period may be kept 2/3 months after validity date.**

2. **In Case of Bank Guarantees submitted by Foreign Vendors-**

   a. **From Nationalized/Public Sector / Private Sector/ Foreign Banks (BG issued by Branches in India)** can be accepted subject to the condition that the Bank Guarantee should be enforceable in the town/city or at nearest branch where the Unit is located i.e. Demand can be presented at the Branch located in the town/city or at nearest branch where the Unit is located.

   b. **From Foreign Banks (wherein Foreign Vendors intend to provide BG from local branch of the Vendor country's Bank)**

   b.1 In such cases, in the Tender Enquiry/ Contract itself, it may be clearly specified that Bank Guarantee issued by **any of the Consortium Banks only** will be accepted by BHEL. As such, Foreign Vendor needs to make necessary arrangements for issuance of Counter- Guarantee by Foreign Bank in favour of the Indian Bank (BHEL's Consortium Bank). It is advisable that all charges for issuance of Bank Guarantee/ counter- Guarantee should be borne by the Foreign Vendor. The tender stipulation should clearly specify these requirements.

   b.2 **In case, Foreign Vendors intend to provide BG from** Overseas Branch of our Consortium Bank (e.g. if a BG is to be issued by SBI Frankfurt), the same is acceptable. However, the procedure at **sl.no. b.1** will required to be followed.

   b.3 The BG issued may preferably be subject to Uniform Rules for Demand Guarantees (URDG) 758 (as amended from time to time). In case, of Foreign Vendors, the BG Format provided to them should clearly specify the same.

   b.4 The BG should clearly specify that the demand or other document can be presented in electronic form.

Sl.	Name of the bank	
1	State Bank of India	
2	Canara Bank	
3	Axis Bank	
4	Bank of Baroda	
5	Central Bank	
6	Citi Bank N.A.	
7	Deutsche Bank **	
8	Exim Bank	
9	Federal Bank Limited	
10	HDFC Bank Limited	
11	Hongkong and Shanghai Banking Corporation Ltd	
12	Indian Bank	
13	ICICI Bank Limited	
14	IDBI Bank Limited	
15	IndusInd Bank Limited	
16	Indian Overseas Bank	
17	Kotak Mahindra Bank Limited	
18	Punjab National Bank	
19	RBL Bank Ltd.	
20	Standard Chartered Bank	
21	Union Bank of India	
22	Yes Bank Limited	
	TOTAL	

ANNEXURE - XVI

PRICE VARIATION FORMULA

Project: Vishnugad Pipalkoti Hydro Electric Project (4X111 MW)
Tender Enquiry No: 92G2400174 dated 15.09.2023

Price adjustment for the supply of 400 kV XLPE Cable

Ca=[{Acu-Bcu}*Vcu] + [{Aal-Bal}*Val]

Ca	Adjusted Unit price after variation per km (USD/km)
Acu, Aal	LME Prices of Copper, Aluminium as on date of adjustment respectively (USD/MT)
Bcu, Bal	LME Prices for Copper, Aluminium on base date respectively (USD/MT)
Vcu, Val	Weight of Copper, Aluminium per km (MT/KM) as per GTP of the OEM/ Cable manufacturer and approved by customer

Conditions applicable to Price adjustment:

1. The Base date shall be the date twenty-eight (28) days prior to the Techno commercial bid opening date.
2. The date of adjustment shall be the midpoint of the period of manufacture.

Note:

1. No price increase will be allowed beyond the original delivery date unless covered by an extension of time awarded by the BHEL under the terms of the contract. No price increase will be allowed for periods of delay for which the Vendor is responsible. BHEL will, however, be entitled to any price decrease occurring during such periods of delay.
2. If the currency in which the contract price is different from the USD, % price escalation will be calculated from formula mentioned above.

SCHEDULE OF COMMERCIAL DEVIATION

Enquiry No: 92G2400174 dated 15.09.2023
Item: Supply of 400 kV XLPE Cable & Accessories (Supply+ Services)
Project: THDC Vishnugad Pipalkoti Hydro Electric Project (4X111 MW)

The following are the deviations/ variations exception from the General Terms and Conditions:

SL.NO.	CLAUSE NO. OF GENERAL TERMS AND CONDITIONS	STATEMENT OF DEVIATION
	NIL Deviation	NIL Deviation

In case, this schedule is not submitted, it will be presumed that the equipment /material to be supplied under this contract is deemed to be in compliance with the Gerneal Terms and Conditions.

If there is NIL deviation,even then the format to be filled as NIL DEVIATION.

Note : Continuation Sheets of like size and format may be used as per the Bidder's Requirement and shall be annexed to this schedule.

All deviations must be mentioned in this format only. Deviation(s) to terms mentioned else where will not be considered.

Signature of the authorised representative of

Place: ……
Date : ……..

Bidder's name :……
Designation:……..
Company Seal:……

SCHEDULE OF TECHNICAL DEVIATION

Enquiry No: 92G2400174 dated 15.09.2023
Item: Supply of 400 kV XLPE Cable & Accessories (Supply+ Services)
Project: THDC Vishnugad Pipalkoti Hydro Electric Project (4X111 MW)

The following are the deviations/ variations exception from the Technical Specifications:

SL.NO.	CLAUSE NO. OF GENERAL TERMS AND CONDITIONS	STATEMENT OF DEVIATION
	NIL Deviation	NIL Deviation

In case, this schedule is not submitted, it will be presumed that the equipment /material to be supplied under this contract is deemed to be in compliance with the Technical Specifications,

If there is NIL deviation,even then the format to be filled as NIL DEVIATION.

Note : Continuation Sheets of like size and format may be used as per the Bidder's Requirement and shall be annexed to this schedule.

All deviations must be mentioned in this format only. Deviation(s) to terms mentioned else where will not be considered.

Signature of the authorised representative of

Place: ……
Date : …….

Bidder's name :……
Designation:……..
Company Seal:……