BHARAT HEAVY ELECTRICALS LTD.
(TRANSMISSION BUSINESS GROUP)
GENERAL TERMS AND CONDITIONS FOR TENDER ENQUIRY

This Format is to be submitted in original duly signed and stamped by bidder. Deviation, if any, is to be brought out clearly in Schedule of Commercial deviation giving clause wise deviation. Any condition / clarification / deviation mentioned elsewhere will not be accepted.

Sr. No	ENQUIRY NO. 224E196 DATED 14/01/2015 DUE ON 10/02/2015
1.	1. Sealed quotations are invited for the items mentioned in the enquiry. Quotations should be typed and free from over writing and erasures, corrections or additions must be clearly written both in words and figures and attested and otherwise offer may be rejected. 2. Bidder must ensure that their quotation is received / dropped in the tender box on or before 14.00 Hrs. of the due date of opening in ***Material Management Division*** ***Transmission Business Group*** ***Tower A, 5th Floor, BHEL, Advant Navis IT Business Park*** ***Plot No 7, Sector - 142, Express way Noida*** ***Noida -201305*** ***DISTT- GAUTAM BUDH NAGAR, UP*** 3. The same shall be opened at 14.30 Hrs. on the same day. Tenders received late shall be rejected. Bidders must ensure that tender documents are deposited on or before due date. 4. **Bids are to be submitted in Two parts:** i) **Techno-commercial bid (Part I)** – To be submitted in duplicate. A copy of price bid (Part II) (**without prices but clearly mentioning the taxes & duties applicable, if any**) is also to be enclosed in Part I bid as confirmation that the bidder has quoted for all the items mentioned in price bid format. ii) **Price bid (Part II)** – To be submitted only in one copy in a separate sealed envelope. This should not contain any Technical or Commercial Terms. The rates should be quoted both in figures and words. In case of any difference between figures and words, the quoted rate in words will prevail over figure. If there is a calculation mistake in multiplication of unit rate with quantity, then the unit rate quoted will be considered for calculation. Both Part I and Part II bids are to be sealed in separate envelope and both envelops to be kept in another common envelope. Each envelope should be sealed and super scribed with enquiry no., item / package name, project name and due date of opening. Note: Representative deputed to witness tender opening must produce an authority letter from the signatory of offer at the time of tender opening.

Sr. No	ENQUIRY NO. 224E196 DATED 14/01/2015 DUE ON 10/02/2015
	5. **For any Technical Clarification, please contact:** **SHRI VIVEK KAPIL, Sr. MANAGER / TBEM** **BHARAT HEAVY ELECTRICALS LIMITED** **TRANSMISSION BUSINESS GROUP** **TOWER A, 5TH FLOOR, ADVANT NAVIS IT BUSINESS PARK,** **PLOT NO-7, SECTOR-142, EXPRESSWAY NOIDA,** **NOIDA-201305,** **DISTT- GAUTAM BUDH NAGAR, UP, INDIA** **Phone : 0120-06748539 / 9818080691** **E-mail : vivekk@bhel.in** **For any Commercial Clarification, please contact:** **SH. S.C. SHIVHARE, Sr. MGR.(TBMM) /** **SMT. ARCHANA KUMARI, Sr. ENGR. (TBMM)** **BHARAT HEAVY ELECTRICALS LIMITED** **TRANSMISSION BUSINESS GROUP** **TOWER A, 5TH FLOOR, ADVANT NAVIS IT BUSINESS PARK,** **PLOT NO-7, SECTOR-142, EXPRESSWAY NOIDA,** **NOIDA-201305,** **DISTT- GAUTAM BUDH NAGAR, UP, INDIA** **Phone : 0120-6748467 / 0120-6748471** **Email: archanak@bhel.in / scshivhare@bhel.in** 6. Price bid should not contain any information / description / terms & condition other than given in Part-I of the bid except prices, otherwise bid is liable for rejection. 7. Price bid submitted along with the bid shall remain valid up to validity of offer. Unsolicited Supplementary / Revised price bid submitted during validity period of offer, unless asked by BHEL, shall not be considered. With-drawl of quotation by the bidder, at any stage after its opening, may entail blacklisting of vendor. 8. Authorized signatory should authenticate tender documents.
2.	**PRICES:** **A. The prices to be quoted are with PVC with following formula.** $P_1 = P_0 \times \{0.85 + 0.15 (A_1/A_0)\} - P_0 + (M_1 - M_0)$ Where, P_1 = Price adjustment amount per kilometer of cable (if it works out negative, that would mean the amount to be recovered by the owner from the contractor) P_0 = Ex-works price per kilometer of cable. A = PVC compound: Price of Grade CW-22, as published by IEEMA. M_1-M_0 = Change in metal components of the ex-works price of particular type and size of cable. M = Weight in MT of metal per km of cable X published price index of metal per MT as published by IEEMA. Published price Index for metal: i) For Aluminium: **Price of LME Average Settlement Price including Premium for Ingot, as published by IEEMA.**

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	ii) For Copper: Price of copper wire rods, as published by IEEMA. Weight in MT of metal per km of cable and price index of metal per MT: As per IEEMA Circulars. Subscript `0` refers to base indices as on 30 days prior to date of bid opening. The base indices in the formula shall be of first notification of IEEMA of the **DEC'' 2014** month. Subscript `1` refers to indices as applicable on 60 (sixty) days prior to the date of shipment. The date of delivery shall be PO delivery date or date of actual despatch, whichever is earlier. The total adjustment shall be subject to a ceiling of ± 20% (plus or minus twenty percent). **B. The prices shall be quoted by the vendors considering following** The prices are to be quoted on **FOR** (Destination) basis. The break-up of price shall be as under:- **a) Ex-works Price:** Ex- works price including packing & forwarding charges. **b) Excise duty: ED exempted against EDEC.** **c) Sales Tax:** ST / VAT / CST (against C-form) to be quoted as percentage in un-price and price bid. In case of interstate sale-in-transit supplier have to provide E1/E2 form. **d) Entry tax / Octroi Charges:** Any Entry tax / Octroi applicable at destination / destination state shall be paid extra on proof of such payment. **e) Freight & Insurance:** Freight and Transit Insurance for door delivery up to destination/store is to be quoted. **f) Type Test charges:** As per technical specification enclosed with this Enquiry. **Note: i) The purchase order shall be placed on Ex – Works basis.** **"BHEL reserves the right to go for Reverse Auction (RA) instead of opening the sealed envelope price bid, submitted by the bidder. 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 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 'online sealed bid' in the Reverse Auction. Non-submission of 'online 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."** **(Further to above clause, please refer attached Annexure I for Terms & Conditions Of Reverse Auction Page 1 & 2)**

Sr. No	ENQUIRY NO. 224E196 DATED 14/01/2015 DUE ON 10/02/2015
3.	**TERMS OF PAYMENT:** 100 % Payment with Taxes, Duties, Freight & Insurance within 60 days (**45 Days for MSE vendor**) from the date of receipt of complete invoice with following documents in 3 sets (Original + 2 copies): - LR duly endorsed in the name of customer by BHEL site - Receipt of material on the attached format by BHEL site - Excise invoice (If Applicable) - Delivery Challan or Packing list (case wise) - Transit insurance certificate from under writers or Copy of Intimation of Transit Insurance duly endorsed by under writers - MICC - Guarantee Certificate - Copy of Performance Bank Guarantee. [A.] Documents to be furnished by vendor immediately after dispatch: - Copy of Invoice - Copy of LR - Copy of Delivery Challan / Packing List - Copy of Insurance Certificate - Copy of Guarantee Certificate [B.] Following Documents to be sent by vendor to TBG, BHEL : - LR duly endorsed in the name of customer by BHEL site - Receipt of material on the attached format by BHEL site - Excise invoice (If Applicable) - Delivery Challan / Packing list (case wise) - Transit insurance certificate from under writers or Copy of Intimation of Transit Insurance duly endorsed by under writers - Dispatch Clearance / MICC - Guarantee certificate - All Test & Inspection Reports
4.	**INTEREST LIABILITY:** In case of any delay in payment due to any reason, BHEL shall not pay any interest on delayed payment.
5.	**GUARANTEE :** The equipment / material shall be guaranteed for 18 months from the date of delivery or 12 months from the date of commissioning, which ever is earlier. The defective material / component shall be replaced free of cost at site.
6.	**PERFORMANCE BANK GUARANTEE:** Bidder shall furnish along with first invoice Performance BG / deposit as per follows. **Option A** BG for 10% of the total Ex-works PO value, valid for 18 months + 3 months claim period (i. e. total 21 months) from the date of last delivery. **Option B** Retention of 10% of the total Ex-works PO value by BHEL from the first bill in lieu of Performance Bank Guarantee, to be released after expiry of 24 months from the date of first delivery. The Bank guarantee shall be from State Bank of India / State bank of Hyderabad / State Bank of Travancore / State Bank of Mysore / Canara Bank / Bank of Baroda / Punjab National Bank / Deutsche Bank / HDFC Bank / Standard Chartered Bank / CITI Bank / ICICI Bank / IDBI Bank / HSBC / any other Nationalised Bank. The original BG should be sent by issuing Bank directly to AGM (Finance), TBG, BHEL.

Sr. No	ENQUIRY NO. 224E196 DATED 14/01/2015 DUE ON 10/02/2015
	All the bank Guarantee shall be from a schedule bank In India acceptable to BHEL. The original BG should be sent by issuing bank directly to AGM (Finance) TBG BHEL. BANK Guarantee should be valid for lodging claim within two month after expiry of guarantee period. **If no option is specified, by default option – A shall be considered for confirmation.**
7.	**FINAL ENGINEERING DOCUMENTATION:** Final documentation as called in the specification is to be submitted within 3 months from the date of despatch of material. In case of default, the Performance BG is liable to be en-cashed.
8.	**INSPECTION:** BHEL and / or customer / third party may inspect the Equipment / Material before despatch. In the event BHEL / Customer waives off inspection, Test Reports and Results shall be submitted for Approval. Supplier shall obtain Approval on Test Reports and MDCC / MICC (Material Inspection Clearance Certificate) before dispatch of equipment. Stage inspection during manufacturing may also be carried out. Material to be dispatched only after getting Dispatch Clearance from BHEL. **Supplier shall send inspection call on prescribed format only, with an advance notice of 15 days. (New Format of Inspection Call attached with this Enquiry).**
9.	**DESPATCH DOCUMENTS:** Following despatch documents are to be immediately sent to purchaser on despatch. - Copy of Invoice - Copy of LR - Copy of Delivery Challan / Packing List - Copy of Insurance Certificate - Copy of Guarantee Certificate
10.	**DELIVERY PERIOD:** Bidder to specify the delivery period in weeks from the date of PO in the Activity Schedule Format enclosed with enquiry. Time for conduction of type test, if required, is to be separately indicated. Note: LR date or Invoice date whichever is later shall be considered as delivery date.
11.	**DELAYED DELIVERY:** In case of delay in execution of order beyond the lot wise contractual delivery, an amount of ½ % of total Ex-Works Value per week or part there-of subject to **maximum of 10% of total Ex-Works value** of P.O. will be withheld.
12.	**VALIDITY:** The offer shall be valid for 120 days from the due date of opening.
13.	**ACCEPTANCE / REJECTION OF TENDER:** BHEL reserves the right to reject in full or part, any or all tender without assigning any reason thereof. BHEL also reserves right to vary the quantities mentioned in the tender.
14.	**EVALUATION: Comparative statement shall be prepared based on overall quantity basis unless otherwise indicated in the enquiry. Evaluation of offers shall be done on the basis of delivered cost to BHEL.**
15.	**DEVIATION:** The bids having deviation(s) w.r.to tender are liable for rejection. However, BHEL, at its discretion, may **load the prices for evaluation of offer as mentioned at Sl. No. - 24.**
16.	**ARBITRATION:** All cases of disputes emanating from and relating to this contract shall be referred to the sole arbitrator appointed by Unit Head / GM, BHEL. The arbitrator may be an employee of BHEL whether serving or retired or any other person nominated by Unit Head/GM BHEL. The arbitration shall be in accordance with 'The Arbitration and Conciliation Act 1996' and the rules there under as amended from time to time. The arbitrator shall give a reasoned award. The decision of the arbitrator shall be final &

Sr. No	ENQUIRY NO. 224E196 DATED 14/01/2015 DUE ON 10/02/2015
	binding upon both the parties. The venue of arbitration shall be Delhi.
17.	**LEGAL SETTLEMENT:** All disputes shall be subject to jurisdiction of court situated in Delhi/New Delhi only. Notwithstanding contained herein anything in this NIT, the original exclusive jurisdiction shall remain of the court at Delhi / New Delhi.
18.	**SUBCONTRACTING:** In case further subcontracting of BHEL order 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 of the responsibility of fulfilling BHEL purchase order requirements.
19.	**RISK PURCHASE:** In case the successful bidder fails to supply or fails to comply with the terms & conditions of the purchase order, BHEL reserves the right to source such material/ component / equipment/ system from any other agency at the risk and cost of the successful bidder.
20.	**ADJUSTMENT OF RECOVERY:** Any amount payable by the supplier under any of the condition of this contract shall be liable to be adjusted against any amount payable to the supplier under any other works/contract awarded to him by any BHEL unit. This is without prejudice to any other action as may be deemed fit by BHEL.
21.	**FORCE MAJEURE CONDITION:** Force Majeure will mean: Circumstances beyond the control of contracting parties such as but not limited to act of God, natural catastrophes, fire, war, embargo, industrial dispute, riot, civil commotion, restrictions etc. Vendors willing to plead force majeure shall inform its effect on fulfilment of contract and shall not be held responsible for non performance in such circumstances.
22.	**DEMURRAGE / WHARFAGE:** For the reasons of delay in receipt of documents from suppliers or due to the same being found to be incomplete, and/or faulty, the suppliers shall be responsible to reimburse in all demurrages / wharfages, if any, paid by BHEL (for stated reasons).
23.	**SPECIAL CONDITION:** Procurement will be from manufacturers only. Manufacturers should submit offers directly. However in case of involvement of any representative the details of the same along with the copy of the agreement should be submitted in the first part of the offer. Principal manufactures must ensure that the nominated representative do not represent any other manufacture for the same item.
24.	**LOADING CRITERIA FOR DEVIATIONS TAKEN BY BIDDER ON:** 24.1 : TERMS OF PAYMENT: If a bidder asks for payment within specified no. of days from the date of receipt of invoice with complete documents as per "Terms of Payment" at sr. No. 3 above, loading to be done as follows: a) Base rate of SBI (as applicable on the date of techno commercial bid opening) + 6 % shall be considered for loading for the period of relaxation sought by the bidder. b) 60 days - No loading 24.2 : DELAYED DELIVERY / PENALITY DUE TO DELAYED DELIVERY: Loading for not accepting this clause / accepting only on un delivered portion shall be the maximum amount specified in this clause. 24.3 GUARANTEE: Normally BHEL may not accept deviation against this clause and offer may be ignored on this deviation, however If the offered guarantee period is less than the tender guarantee period the ex- works prices shall be loaded for the

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	difference in the period (higher of the difference with respect to guarantee required from date of delivery and date of commissioning) @ 2.5 % per year for number of months(fractional months to be rounded off to next higher)
25.	"MSE suppliers can avail the intended benefits only if they submit along with the offer, attested copies of either 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 (Format enclosed at Annexure -1 where deemed validity of EM II certificate of five years has expired) applicable for the relevant financial year (latest audited). Date to be reckoned for determining the deemed validity will be the date of bid opening (Part 1 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 attested by a Gazetted officer. "
26.	**<u>Pre Qualification Criteria:</u>** Only Indigenous vendor to participate in this Enquiry. The offered 1.1 kV Aux Power & Control Cables should be of approved make of MPPTCL. **<u>Or</u>** Shall meet the technical requirements as mentioned below for 1.1 kV Aux Power & Control Cables not covered in approved vendor list of MPPTCL: 1. The manufacturer for supply of 1.1 kV Aux Power & Control Cables should have a minimum experience of **Five Years as on 20.11.2013** for supply of 1.1 kV Aux Power & Control Cables (which must have been type tested) and must be an approved vendor of Electricity Boards/ Power Grid/ Transmission utility or a regular supplier of MPPTCL. The certificate of Electricity Boards/ Power Grid/ Transmission utility towards supply of the item will have to be submitted by the bidder for obtaining approval of such manufacturer from MPPTCL. 2. The 1.1 kV Aux Power & Control Cables manufactured and supplied should be in operation for a period of **two years as on 20.11.2013**, for which performance report is required to be submitted. The performance report should be issued within last two years from the date 20.11.2013. The Performance report issued by the Power Utilities or User Agencies clearly indicating the Order No. & Date, Ordered quantity and the quantity for which the performance report has been issued, shall only be acceptable. 3. Manufacturing Capacity - 100% quantity of 1.1 kV Aux Power & Control Cables covered in the Bid should have been manufactured & supplied in any one year during the past three years by the manufacturer, as on 20.11.2013. To substantiate above requirement indicated in Sl. No. 1, 2 & 3, Bidder may please note that the design, type, rating & class of equipments/ material must be similar to the design, type, rating & class or higher rating & class, as specified in the Bid. For substantiating requirement at Sl. no 3, CA certificate is acceptable."

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	The Bidder must ensure that they confirm the Pre Qualification Criteria and the necessary documentation in this regard would be provided by Bidder to BHEL along with their offer for ascertaining that they confirm the Pre Qualification Criteria. BHEL Reserves the Right to reject any offer from Bidder in case of Non – Compliance to the Pre Qualification Criteria or inability of Bidder to produce the necessary documentation for ascertaining that they confirm the Pre Qualification Criteria.

Signature of Bidder
Seal

Terms & Conditions of Reverse Auction

Against this enquiry for the subject item/ system with detailed scope of supply as per enquiry specifications, BHEL may resort to "REVERSE AUCTION PROCEDURE" i.e., ON LINE BIDDING (THROUGH A SERVICE PROVIDER). The philosophy followed for reverse auction shall be English Reverse (No ties).

1. For the proposed reverse auction, technically and commercially acceptable bidders only shall be eligible to participate.

2. Those bidders who have given their acceptance for Reverse Auction (quoted against this tender enquiry) will have to necessarily submit 'online sealed bid' in the Reverse Auction. Non-submission of 'online sealed bid' by the bidder for any of the eligible items for which techno-commercially qualified, will be considered as tampering of the tender process and will invite action by BHEL as per extant guidelines in vogue.

3. BHEL will engage the services of a service provider who will provide all necessary training and assistance before commencement of on line bidding on internet.

4. In case of reverse auction, BHEL will inform the bidders the details of Service Provider to enable them to contact & get trained.

5. Business rules like event date, time, bid decrement, extension etc. also will be communicated through service provider for compliance.

6. Bidders have to fax the Compliance form (annexure IV) before start of Reverse auction. Without this, the bidder will not be eligible to participate in the event.

7. In line with the NIT terms, BHEL will provide the calculation sheet (e.g., EXCEL sheet) which will help to arrive at "Total Cost to BHEL" like Packing & forwarding charges, Taxes and Duties, Freight charges, Insurance, Service Tax for Services and loading factors (for non-compliance to BHEL standard Commercial terms & conditions) for each of the bidder to enable them to fill-in the price and keep it ready for keying in during the Auction.

8. Reverse auction will be conducted on scheduled date & time.

9. At the end of Reverse Auction event, the lowest bidder value will be known on auction portal.

10. The lowest bidder has to fax/e-mail the duly signed and filled-in prescribed format for price breakup including that of line items, if required, (Annexure VII) as provided on case-to-case basis to Service provider within two working days of Auction without fail.

11. In case BHEL decides not to go for Reverse Auction procedure for this tender enquiry, the Price bids and price impacts, if any, already submitted and available with BHEL shall be opened as per BHEL's standard practice.

12. Bidders shall be required to read the "Terms and Conditions" section of the auctions site of Service provider, using the Login IDs and passwords given to them by the service provider before reverse auction event. Bidders should acquaint themselves of the 'Business Rules of Reverse Auction', which will be communicated before the Reverse Auction.

13. If the Bidder or any of his representatives are found to be involved in Price manipulation/ cartel formation of any kind, directly or indirectly by communicating with other bidders, action *as per extant BHEL guidelines*, shall be initiated by BHEL and the results of the RA scrapped/ aborted.

14. The Bidder shall not divulge either his Bids or any other exclusive details of BHEL to any other party.

15. In case BHEL decides to go for reverse auction, the H1 bidder (whose quote is highest in online sealed bid) may not be allowed to participate in further RA process.

SCHEDULE OF PRICE

(BIDDERS TO STRICTLY ENSURE SUBMITTING THE PRICE BIDS IN THIS FORMAT)

NOTE: THIS FORMAT IS TO BE SUBMITTED IN ORIGINAL ONLY, DULY FILLED IN. REPRODUCTION OF THIS FORMAT ON BIDDER'S LETTER HEAD OR ON OTHER PAPER IS NOT ACCEPTABLE.

TENDER ENQUIRY NO. : 224E196 dated 14/01/2015

SL. NO.	DESCRIPTION OF ITEM	UNIT	QTY.	UNIT PRICE EX. WORKS (Rs.)	TOTAL EX. WORKS (Rs.) (5 * 4)	UNIT FREIGHT & INSURANCE (Rs.)	TOTAL Freight & insurance (Inclusive of Service Tax, if any) (Rs.) (7 * 4)	ED @ .....% OF OF COL 6	CST / ST @ ...% OF COL 6+9 (6 + 9)	TOTAL F.O.R. DESTINATION PRICE (Rs.) (6+8+9+10)	M-FACTOR (FOR PVC CALCULATION)
1	2	3	4	5	6	7	8	9	10	11	12
1	2C x 2.5 sq mm PVC/Copper, Armoured Control cable	KM	11								
2	4C x 2.5 sq mm PVC/Copper, Armoured Control cable	KM	33								
3	4C x 4 sq mm PVC/Copper, Armoured Control cable	KM	120								
4	4C x 10 sq mm PVC/Copper, Armoured Control cable	KM	39								
5	12C x 2.5 sq mm PVC/Copper, Armoured Control cable	KM	49								
6	19C x 2.5 sq mm PVC/Copper, Armoured Control cable	KM	98								
7	3.5C x 300 sq mm PVC/Aluminium, Armoured Aux. Power cable	KM	6								
	TOTAL PRICE										

Rate of Service Tax applicable on F&I, if any .....% (If nothing is specified, by default it shall be considered as NIL)

NOTE:
1. PLEASE NOTE THAT UNPRICED COPY OF PRICE BID (i.e. WITH ALL PRICES BLANKED) SHALL BE FURNISHED ALONG WITH TECHNO-COMMERCIAL BID.
2. REQUIRED COPIES OF FORMAT BE MADE & DETAILS MAY BE ANNEXED.
3. THE PRICES MUST BE QUOTED IN THE PRESCRIBED UNIT ONLY.
4. SALES TAX RATE AS APPLICABLE FOR SPECIFIED DESTINATION SHALL BE QUOTED. IN CASE OF CST, RATE AGAINST "C" FORM SHALL BE QUOTED.
5. IN CASE OF VARIED ED SLAB RATES, CONFIRM YOUR OPTION FOR "X" OR "Y". (STRIKE OFF WHICH IS NOT APPLICABLE) IF NO OPTION IS MENTIONED "X" SHALL BE TAKEN.
6. THE VENDORS MUST INDICATE THE APPLICABLE TARIFF NOS. UNDER WHICH ED AND / OR CST WOULD BE PAID BY THEM TO THE TAX AUTHORITIES.
7. IF A VENDOR SUBMITS AN OFFER WITH REDUCED ED AND OR CST APPLICABLE THAN NORMALLY PAID ON SUCH ITEMS, THEY SHOULD SUBMIT NECESSARY DOCUMENTARY PROOF FOR THE SAME.

"X" THE MAXIMUM ED SLAB RATE BE CONSIDERED FOR PRICE COMPARISON. IN THE EVENT OF ORDER ED AT ACTUAL BE PAID.

"Y" THE QUOTED ED RATE BE CONSIDERED FOR PRICE COMPARISON. IN THE EVENT OF ORDER ED AT ACTUAL RATE LIMITED TO QUOTED RATE BE PAID.

SIGNATURE & SEAL OF TENDERER

TRANSMISSION BUSSINESS GROUP
MATERIAL MANGEMENT
BHEL, NOIDA

ACTIVITY SCHEDULE

Please submit this format duly filled in along with offer. Time indicated will be used for calculating contractual delivery period.

ENQUIRY NO. 224E196 Dated: 14/01/2015

PROJECT: MPPTCL Balaghat, Badnawar, Bhopal, Chhegaon & Nagdah

ITEM: 1.1 kV AUXILIARY POWER & CONTROL CABLE

VENDOR : OFFER REF.

SL. NO.	ACTIVITY	ACTIVITY TIME IN WEEKS	REMARKS IF ANY
1.	Receipt of P.O		
2.	P.O Acceptance	ONE WEEK	Vendor must Submit Po acceptance with in one week
3.	Submission of documents necessary for getting manufacturing clearance like Drawings, data sheet etc.		Documents complete in all respect are to be Submitted. Delay in approval on account of incomplete / inadequate information shall be the responsibility of supplier
4.	Review and Approval of documents and issue of manufacturing clearance	BHEL ACTIVITY	Vendor must ensure to reply all queries expeditiously.
5.	Manufacturing Time		Manufacturing time be indicated considering all constrains & must include time required for internal inspections etc.
6	Raise inspection call	-VE 2 WEEKS TO SL NO 5	Call for inspection must be raised at least two weeks in advance in the prescribed format. Non availability of offered material for inspection to the inspector will be viewed very seriously & may result in financial implications. The date of inspection must be with in the period indicated in 5 above.
7	Inspection	BHEL	
8	Issue of MICC, MDCC & other documents like EDEC , Road permits etc	BHEL	Vendor must indicate requirement well in advance.
9	Dispatch	ONE WEEK	Vendor must ensure to dispatch with in one Week of receiving all documents required

Total time in vendor's scope:

Please mention constraints if any. For multiple lot delivery activity landmark for each lot should be mentioned. Multiple inspection calls for one lot are to be avoided & delay on this account shall be vendor's responsibility. Vendors to quote their Best Delivery Plan.

SIGNATURE AND SEAL

ENQUIRY NO. 224E196 Dated: 14/01/2015

SCHEDULE OF COMMERCIAL DEVIATION

The following are the deviations / variations exception from the General Terms and Conditions:-

SL. NO.	CLAUSE NO. OF GENERAL TERMS & CONDITIONS	STATEMENT OF DEVIATION

Incase, 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 General 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.

Place ……..

Date ……..

Signature of the authorized representative of

Bidder's Name …….

Designation ……..

Company seal …….

ENQUIRY NO. 224E196 Dated: 14/01/2015

SCHEDULE OF TECHNICAL DEVIATION

The following are the deviations / variations exception from the Technical Specifications:-

SL. NO.	CLAUSE NO. OF TECHNICAL SPECIFICATIONS	STATEMENT OF DEVIATION

Incase, 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.

Place ……..

Date ……..

Signature of the authorized representative of

Bidder's Name ……

Designation ……..

Company seal ……

ENQUIRY NO. 224E196 Dated: 14/01/2015

CHECKLIST

SCHEDULE OF INFORMATION TO BE FURNISHED WITH THE OFFER

NOTE: This format is to be submitted in original only, duly filled in. Reproduction of this format on bidder's letter head or on other paper is not acceptable.

Put a tick mark on "YES" if the information is enclosed with the offer or put a tick mark on "NO" if the information is not enclosed or write "NOT APPLICABLE" if the information is not applicable.

1.	Technical offer with detailed schedule of equipment / material and spares enclosed.	YES / NO
2.	Guaranteed Technical Particulars as per Section – 4 enclosed.	YES / NO
3.	Schedule of deviation, if any, clause wise with respect to Technical Specification enclosed.	YES / NO
4.	Standard Manufacturing Quality Plan enclosed.	YES / NO
5.	GA Drawings with dimensions and weights & foundation / fixing details enclosed.	YES / NO
6.	Drawing and Data submission schedule enclosed.	YES / NO
7.	Type Test Reports enclosed.	YES / NO
8.	Bar Chart showing the schedule indicating time required for design, manufacture, test and inspection, transport, erection, site testing and commissioning enclosed.	YES / NO
9.	Makes of all components as per technical Specification enclosed.	YES / NO
10.	Schedule of commercial deviation exception from the General Terms and Conditions	YES / NO

The above checklist is verified for:-

Offer Ref. :

Equipment :

Submitted by : M/s

Project Reference. :

Signed with Seal ……..

Date ……..

Annexure - I

Certificate by Chartered Accountant on letter head

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

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

1. **For Manufacturing Enterprises:** Investment in plant and machinery (i.e. original cost excluding land and building and the items specified by the Ministry of Small Scale Industries vide its notification No.S.O.1722(E) dated October 5, 2006 :
   Rs.....Lacs
2. **For Service Enterprises:** Investment in equipment (original cost excluding land and building and furniture, fittings and other items not directly related to the service rendered or as may be notified under the MSMED Act, 2006:
   Rs.....Lacs

(Strike off whichever is not applicable)

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

Or

The company has been graduated from its original category (Micro/ Small) **(Strike off which is not applicable)** and the date of graduation of such enterprise from its original category is ..... (dd/mm/yyyy) which is within the period of 3 years from the date of graduation of such enterprise from its original category as notified vide S.O. No. 3322(E) dated 01.11.2013 published in the gazette notification dated 04.11.2013 by Ministry of MSME.

Date:

(Signature)

Name -

Membership number -

Seal of Chartered Accountant

INSPECTION REQUEST

1. Name & Address of Supplier :
2. Project :
3. Purchase Order No., Revision No. & Date :
4. Details of equipment / Material to be Inspected

Sl. No.	Material offered for Inspection	P.O. Item No.	Total Quantity Ordered	Quantity offered for Inspection	Quantity Already Cleared	P.O. value of offered qty.

5. For structure, whether BOM & Proto Corrected Drawings approved and available at place of inspection : Yes / No
6. Whether GTP/Drgs approved in Category – 1 available at place of inspection : Yes / No
7. Whether Quality Plan approved in Category – 1 available at place of inspection : Yes / No.
8. Whether all type tests approved by Engineering :Yes / No
9. (a) Place of Inspection & Address :
9. (b) Name & contact No. of Supplier rep. for inspection :
10. Sub – supplier contact person's name & contact No. :
11. Weekly off day :
12. Working Hours :
13. Date on which inspection requested (Inspection call to be raised at least 7 days prior to inspection) :
14. No of road permits required :

It is certified that the above materials shall be completed in all respects and shall have been inspected by us before the date indicated above for inspection. You are requested to please depute your representative for inspection

Signature
Name :
Contact No. :
Date :

Distribution :

1. Material Management , BHEL, New Delhi

Note :

1. Unsigned inspection request & Inspection requests not given in this format are not accepted.
2. Drawings, Quality Plan should be approved in category – I by BHEL Transmission Business Engineering Management before the inspection date. In case inspection request is given without Category – I approved documents, supplier should be obtain from BHEL Transmission Business Engineering Management in writing to this effect and attach to inspection request.

BHARAT HEAVY ELECTRICALS LIMITED
TRANSMISSION BUSINESSS GROUP
MATERIAL RECEIPT CERTIFICATE

Date: _____

a) Site Name :
b) Site Address:
c) PO No. with date:
d) Supplier Name:
e) Invoice no. with date:
f) LR No with date:
g) Transporter Name:
h) Vehicle No.:
i) Date of receipt of material at site:
j) Destination: From _____ To _____
k) Material details (as mentioned below):

S.No	Item Description	Type of Packages	Unit (MT/KM/ NO.)	Qty as per packing list	Qty Received	Qty Accepted	Remarks
1.							
2.							
3.							
4.							
5.							
6.							
7.							
8.							
9.							

Other Remarks:

Signature with date: _____
Name & Designation: _____
(With Seal)

(ON RS.100/- NON - JUDICIAL STAMP PAPER)

PROFORMA FOR SECURITY-CUM-PERFORMANCE GUARANTEE

1. This deed of Guarantee made this _____day of _____200 ___ by _____Bank Ltd., _____in favour of **Bharat Heavy Electricals Limited, Transmission Business Group, Tower-A, 5th Floor, Advant Navis IT Business Park, Plot-7, Sector-142, Expressway Noida, Noida-201305** having their registered office at **BHEL House, Siri Fort, New Delhi - 110 049.**

2. Whereas **M/s** _____(here in after called the **Contractor** / **Seller**) have entered into a Contract bearing No. _____ dated _____(herein after called the **Contract**) for supply / erection of **M/s Bharat Heavy Electricals Limited** (hereinafter called the **Company**).

3. And whereas the said Contract Inter-alia provides that the Contractor / Seller shall pay to the company a sum of Rs. _____only, towards **Security deposit-Cum-Performance Guarantee** in the for and manner therein specified.

4. And whereas the Seller/Contractor have approached _____ Bank Limited (hereinafter referred to as the **Guarantor**) and at their request and in consideration of the arrangement arrived at between the **Contractor** and the **Guarantor**, the Guarantor has agreed to give the Guarantee as herein after mentioned in favour of the Company.

NOW THIS DEED WITNESSES AS FOLLOWS :

5. The Guarantor by the hand of Mr. _____ and its lawfully and fully constituted attorney and do hereby guarantee the due and faithful performance of the said contract and do hereby irrevocably undertake and promise to pay the Company without any demur merely on demand made by them a sum not exceeding Rs. _____ only in case the Company sustains any loss or damage by reason of any breach, default, by the Contractor / Seller of any of the terms conditions, stipulations or undertakings or any one of them contained in the said contract and the tender documents attached hereto and for payment of any moneys payable by the Contractor/ Seller to the Company under the terms and conditions of the said contract. The decision of the company regarding the breach, default, loss, damage or payment shall be conclusive and binding in the guarantor irrespective of the fact whether the contractor/seller admits or denies such claims or questions its correctness in any court, tribunal or arbitration proceedings or before any other authority.

(Contd....2.)

6. The company shall have the fullest liberty without effecting in any way the liability of the Guarantor under this Guarantee, from time to time to vary any of the terms and conditions of the contract or extend time by the Seller/Contractor or to postpone for any time and from time to time any of the powers exercisable by its against the Seller/Contractor and either to enforce or forbear from enforcing any of terms and conditions governing the contract or securities available to the Company and the guarantor shall not be released from it's liability under these presents by any exercise by the company of the liberty with reference to the matters aforesaid or by reason of time being given to the seller or any other forbearance, act or omission on the part of the company or any induigence by the company to the Seller/Contractor or of any other matter or thing whatsoever which under the law relating to sureties, would but for this provision have the effect of so releasing the Guarantor/contractor from its liability under this Guarantee.

7. This Guarantee shall remain in full force and effect and the Guarantor shall be liable under the same irrespective of any concession or time being granted by the company to the contractor in or for fulfilling the said contract and this Guarantee shall remain in full force irrespective of any change in terms, conditions, stipulations or any variations in the terms of contract irrespective of whether notice of such change and / or variation is given to the Guarantor or not and the claim to receive such notice of any change and or variation of the terms/or conditions of the contract is hereby specifically waived by the Guarantor.

8. The Guarantor here in contained shall not be determined prejudiced or effected by the liquidation or winding up or insolvency of or change in the constitution of the contractor but shall in all respects and for all purposes be binding and operative until all payments or all moneys due or that may hereafter become payable to the company are paid in respect of any liability or obligation of the contractor under the contract.

9. The Guarantor further agree that the Guarantee herein contained shall remain in full force and effect during the period that would be taken for the commencement of the contract till end of the contract and its claim satisfied or discharged and till the company certified that the terms and conditions of the contract have been fully and properly carried out by the seller and accordingly discharges this Guarantee, subject, however, that the company shall have no claim under this guarantee after _____ months from the date of completion of the guarantee has been served on the guarantor before the expiry of the said period in which case the same shall be enforceable against the Guarantor not with standing the fact that the same is enforced after expiry of said period.

   The Guarantor undertake not to revote this Guarantee during the period it is in force except with the precious consent of the company in writing and agree that any liquidation or winding up or insolvency or dissolution or any change in the constitution of the Seller or the guarantor shall not discharge the Guarantor's liability here under.

It shall not be necessary for the company to proceed against the seller before proceeding against the Guarantor and the Guarantee herein contained shall be enforceable against them not with standing any security which the company may have obtained or obtained from the seller shall at the time when proceedings are taken against the Guarantor here under be outstanding or unrealised.

The Guarantor hereby declares that it has power to execute this Guarantee and the executant has full powers to do so on its behalf under the power of attorney dated _____granted to him by the proper authorities of the Guarantor.

10. Not withstanding anything here in before contained, our liability under this Guarantee is restricted to Rs. _____(Rs._____only) and will expire on _____ and unless a claim in writing is presented to us or an action or suit to enforce the claim is filed against us, within ***three months*** from the date, all our rights shall be forfeited and we shall be relieved and discharged from all our liabilities there under.

IN WITNESS whereof the _____(Bank) have hereunto set and subscribed their hands the day, month and year first above written.

SIGNED FOR AND ON
BEHALF OF THE BANK

WITNESSESS

Name and Address **Signature**

1. **……**
……
……
……
……

2. **……**
……
……
……
……

BHARAT HEAVY ELECTRICALS LIMITED

TRANSMISSION BUSINESS ENGINEERING MANAGEMENT

DOCUMENT No.	TB-368-510-022	Rev 00	Prepared	Checked	Approved
TYPE OF DOC.	TECHNICAL SPECIFICATION	NAME	RD	VK	RS
TITLE		SIGN			
1.1 kV Aux Power & Control Cables		DATE	18/11/14	15/11/14	28/11/14
		GROUP	TBEM	W.O. No	83012
CUSTOMER	MADHYA PRADESH POWER TRANSMISSION CO. LTD.				
CONSULTANT	------				
PROJECT	400kV SUBSTATION PACKAGE AT BALAGHAT, BADNAWAR, BHOPAL, CHHEGAON AND NAGDA				

CONTENTS

Sec. No.	Description	No. of Sheets
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2.	Equipment Specification	15
3.	Project Details & General Technical Requirements	14
4.	Guaranteed Technical Particulars **(To be furnished at Contract Stage)**	03
5.	Checklist **(To be furnished at Tender Stage)**	04

Rev No.	Date	Altered	Checked	Approved	REVISION DETAILS

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

SECTION 1
SCOPE, SPECIFIC TECHNICAL REQUIREMENTS AND QUANTITIES

1.0 SCOPE

This Specification covers the requirements of design, manufacture, testing at manufacturer's Works, packing, supply and delivery at site of 1.1 kV Aux Power & Control Cables as listed under this specification. This section covers the specific technical requirements of 1.1 kV Aux Power & Control Cables. This constitutes minimum technical parameters for the above item as specified by the customer (MPPTCL). The offered equipment shall also comply with the General Specification for the project as detailed under section-3 of this specification.

In case of any conflict between the technical details mentioned in this section and the remaining sections of this document, then Section-1 shall prevail and is to be considered as binding requirement.

The specification comprise of following sections:

Section-1:	Scope, Specific Technical Requirements and Quantities.
Section-2:	Equipment Specification.
Section-3:	Project Details and General Technical Requirements.
Section-4:	Guaranteed Technical Particulars.
Section-5:	Checklist.

Note: The term 'Owner' appearing in this specification shall refer to MPPTCL, the term 'Purchaser' shall refer to BHEL and the term 'Contractor' shall refer to the successful Bidder.

1.1 THE EQUIPMENT IS REQUIRED FOR THE FOLLOWING PROJECT

Name of customer: Madhya Pradesh Power Transmission Co. Ltd. (MPPTCL)

Name of consultant: ----------

Name of Projects: 400kV Substation Package at Balaghat, Badnawar, Bhopal, Chhegaon and Nagda

Refer Section - 3 for Project Details and General Specifications.

1.2 SPECIFIC TECHNICAL REQUIREMENTS

1.2.1 As per Section-2

1.2.2 (a) **Strip armouring method (a) mentioned in Table 5, Page-6 of IS: 1554 (Part 1) - 1988 shall not be accepted for any of the cables.**

(b) **Strip armouring method (a) mentioned in Table 6, Page-6 of IS: 7098 (Part 1) - 1988 shall not be accepted for any of the cables.**

1.3 QUANTITIES

Sl. No.	Type of Control Cables	Quantity (kM)					
		Balaghat	Badnawar	Bhopal	Chhegaon	Nagda	Total
1.1	2C x 2.5 sq mm PVC/Copper, Armoured	1.0	1.0	3.0	3.0	3.0	**11.0**
1.2	4C x 2.5 sq mm PVC/Copper, Armoured	10.0	14.0	3.0	3.0	3.0	**33.0**
1.3	4C x 4 sq mm PVC/Copper, Armoured	50.0	61.0	3.0	3.0	3.0	**120.0**
1.4	4C x 10 sq mm PVC/Copper, Armoured	10.0	20.0	3.0	3.0	3.0	**39.0**
1.5	12C x 2.5 sq mm PVC/Copper, Armoured	15.0	25.0	3.0	3.0	3.0	**49.0**
1.6	19C x 2.5 sq mm PVC/Copper, Armoured	25.0	64.0	3.0	3.0	3.0	**98.0**
	Type of Aux Power Cables						
2.1	3.5C x 300 sq mm PVC/Aluminium, Armoured	1.0	3.0	1.0	1.0	0.0	**6.0**

Note:

1) The above quantities are tentative and the length of total cables procured may be subject to a change of -10% to +30% before the placement of order. Quantity variation on the total ordered cables shall be ±10% at contract stage.

2) Some of the cable types may not be ordered at all at contract stage.

~~3) Cut lengths for cables marked as (*) shall be informed during detailed engineering stage.~~

All Control and Power Cables shall be supplied in drum length of ~~1000~~/800 m, unless otherwise specified. For power cable with conductor cross sectional area 300sqmm and above may be supplied in 500m drums. Owner shall have the option of rejecting cable drums with shorter lengths. The cable length per drum is allowed a tolerance of ±5%. However, the total quantity of cables after taking into consideration of all cable drums for each size shall be within the tolerance of ±2%.

1.4 TESTS

Cables shall conform to type tests including additional type tests as per technical specification (Section-2) and shall be subject to routine & acceptance tests in accordance with requirements stipulated under respective sections.

The reports for all type tests and additional type tests as per technical specification shall be furnished by the bidder along with equipment / material drawings.

The bidder will conduct the routine tests on each drum length. All the type and acceptance tests shall be conducted as per specification and relevant standards/ approved MQP. These tests will be witnessed by owner/purchaser/purchaser's representatives.

The prices for conducting all tests are deemed to be included in respective cable prices.

1.5 QUALITY PLAN

The manufacturer shall carry out contract works in accordance with sound quality management principles which shall include items such as controls which are necessary to ensure full compliance to all requirements of the specification & applicable international standards. These quality management requirement shall apply to all activities during design, procurement, manufacturing, inspection, testing, packaging, shipping, inland transportation, storage, site erection & commissioning. Manufacturer shall submit detailed Quality Plan for BHEL / customer's approval.

1.6 PRE-QUALIFYING REQUIREMENTS

There is no PQR for the MPPTCL-approved bidders. The bidders for supply of 1.1 kV Aux Power & Control Cables not covered in approved vendor list of MPPTCL will have to meet the following PQR:

1. The bidder should have a minimum experience of Five Years as on 20.11.2013 for supply of 1.1 kV Aux Power & Control Cables (which must have been type tested) and must be an approved vendor of Electricity Boards/ Power Grid/ Transmission utility or a regular supplier of MPPTCL. The certificate of Electricity Boards/ Power Grid/ Transmission utility towards supply of the item will have to be submitted by the bidder for obtaining approval of such manufacturer from MPPTCL.
2. The equipment/ material manufactured and supplied should be in operation for a period of two years as on 20.11.2013, for which performance report is required to be submitted. The performance report should be issued within last two years from the date 20.11.2013. The Performance report issued by the Power Utilities or User Agencies clearly indicating the Order No. & Date, Ordered quantity and the quantity for which the performance report has been issued, shall only be acceptable.
3. Manufacturing Capacity - 100% quantity of Equipment/ Material covered in the Bid should have been manufactured & supplied in any one year during the past three years by the manufacturer of that Equipment/ Material covered in the Bid, as on 20.11.2013.

To substantiate above requirement indicated in Sl. No. 1, 2 & 3, Bidder may please note that the design, type, rating & class of equipments/ material must be similar to the design, type, rating & class or higher rating & class, as specified in the Bid. For substantiating requirement at Sl. no 3, CA certificate is acceptable."

SECTION – II

2.5.3 TECHNICAL SPECIFICATIONS FOR POWER AND COPPER CONTROL CABLES

1.0 SCOPE:

This scope of this specification covers design, manufacturing supply of Power and Copper Control Cables, ~~as per Section-II, Volume-II~~. The bidder mentioned in the Section of Technical specification means "Original Equipment Manufacturer (OEM)". The purchaser means the "MPPTCL".

In case bidder is not OEM, sole responsibility of offering equipment / material of manufacturer as per this specification requirement shall rest on the bidder.

2.0 STANDARDS -

Applicable standards for offered equipment / material shall be as per ~~Section-1, Volume-II~~ APPENDIX-A, SECTION-2.

3.0 CLIMATIC CONDITIONS –

Applicable climatic conditions shall be as per Section 3, ~~Volume-II~~.

4.0 SYSTEM PARTICULARS -

Applicable system particulars shall be as per Section 3, ~~Volume-II~~.

5.0 GENERAL TECHNICAL REQUIREMENTS & CONSTRUCTIONAL DETAILS :

The cables shall be suitable for laying on racks, in ducts, trenches, conduits and underground buried installation with chances of flooding by water. Cables shall be designed to withstand mechanical, electrical and thermal stresses developed under steady-state and transient operating conditions as specified elsewhere in this specification.

5.1 CONTROL CABLES:

Control cables shall be of 1.1 KV grade, multicore ~~(as specified in Clause 1.3 above)~~, PVC insulated, PVC inner sheathed, Armoured, PVC outer sheathed with Solid copper conductor for cables of 2.5 sq.mm and 4 sq. mm sizes and Stranded copper conductor for cables of 10 sq.mm size conforming to latest version of IS:1554 or equivalent International Standards.

5.1.1 CONDUCTOR:

The conductor shall be made from high conductivity copper rods complying with latest version of IS:613 or equivalent International Standards. The conductor shall consist of annealed copper wires complying with IS:8130 with latest amendments or equivalent International Standards.

5.2 INSULATION:

The conductor shall be provided with PVC insulation applied by extrusion in accordance with latest version of IS:5831 or equivalent International Standards. The average thickness of insulation shall be in accordance with the IS:1554 (Part-I) with latest amendments or equivalent International Standards.

The insulation shall be so applied that it fits closely on the conductor and shall be possible to remove it without damages to the conductor.

5.3 CODE IDENTIFICATION:

Colouring of insulation shall identify cores of the cables of upto 5 cores. Following colour schemes shall be adopted:

S. No.	Number of Cores	Colour Scheme
1	1 Core	Red, Black, Yellow or Blue
2	2 Cores	Red and Black
3	3 Cores	Red, Yellow and Blue
4	4 Cores	Red, Yellow, Black and Blue
5	5 Cores	Red, Yellow, Black, Blue and Grey
~~6~~	~~6 Cores and above~~	~~Two adjacent cores (counting anti-clockwise direction core) in each layer, Blue and Yellow, remaining cores Grey or in accordance with the scheme given in IS: 1554 Clause 10.3~~

The cables having more than 5 cores, ~~as an alternate to the provision of (6) above,~~ the core identification may be done by numbers as indicated in latest version of IS :1554 (PART-I) Clause 10.3.

5.4 LAYING UP OF CORES:

In multi-core cables, the cores shall be laid up together with a suitable lay, the outer most layer shall have right-hand lay and successive layer shall be laid with opposite lay, where necessary, the interstices shall be filled with non hygroscopic materials.

5.5 INNER SHEATH:

The laid up cores shall be provided with inner sheath applied by extrusion. It shall be ensured that the shape be as circular as possible. The inner sheath shall be so applied that it fits closely on the laid up cores and it shall be possible to remove it without damage to the insulation. The thickness of inner sheath shall be conforming to latest version of IS:1554 (Part-I) or equivalent International Standards.

5.6 FILLER AND INNER SHEATH:

The filler and inner sheath shall be of the following:

(i) Unvulcanised rubber, or

(ii) Thermoplastic materials

Unvulcanised rubber or thermoplastic material used shall not be harder than PVC used for insulation and outer sheath. The material shall be chosen to be compatible with temperature ratings of the cable and shall have no deterious effect on any other component of the cable.

5.7 ARMOURING:

Armouring shall be of the following:

(i) Galvanized round steel wires, or

(ii) Galvanized steel strip.

The galvanized steel wires/ strips shall comply with the requirements of latest version of IS:3975 or equivalent International Standards. The armouring shall be of galvanized steel, as follows:

S. No.	Calculated nominal size of Cable under armour	Type of armour and size Steel strip/Round wire
1	Upto 13 mm.	1.4 mm. dia GS wire
2	Above 13 upto 25 mm.	0.8 mm. thick GS strip/1.6 mm. dia GS wire
3	Above 25 upto 40 mm.	0.8 mm. thick GS strip/2.0 mm. dia GS wire
4	Above 40 upto 55 mm.	1.4 mm. thick GS strip/2.5 mm. dia GS wire
5	Above 55 upto 70 mm.	1.4 mm. thick GS strip/3.15 mm. dia GS wire
6	Above 70 mm.	1.4 mm. thick GS strip/4.0 mm. dia GS wire

The gap between armour wire/strip shall not exceed one armour wire/strip space and there shall be no cross over/over- riding of armour wire/strip. The minimum area of coverage of armour shall be 90%. The breaking load of armour joint shall not be less than 95% of that of wire/strip. Zinc rich paint shall be applied on armour joint surface.

5.8 OUTER SHEATH:

The outer sheath shall be applied by extrusion. It shall be applied:

(i) Over the inner sheath in case of unarmoured multicore cables.

(ii) Over the armouring in case of armoured multicore cables.

The outer sheath shall be applied by extrusion. It shall be applied over the armouring in case of armoured multicore cables.The outer sheath shall be so applied that it fits closely over armouring. It shall be possible to remove it without damage to the insulation/inner sheath. The colour of the outer sheath shall be black.

The thickness of outer sheath insulation shall conform to latest version of IS:1554 Part-I or equivalent International Standards.

6.0 ALUMINIUM POWER CABLES:

Power cables shall be of 1.1 KV grade, multicore (as specified above), PVC insulated, PVC inner sheathed, armoured, PVC outer sheathed with stranded Aluminium conductor and Heavy duty Galvanized Single Flat Steel armoured confirming to IS 1554 or equivalent International Standards.

6.1 CONDUCTOR:

Aluminium conductor used in power cables shall comply with latest version of IS:8130 or equivalent International Standards.

7.0 IDENTIFICATION:

In addition to Manufacturer's identification on cable as per Clause-17.1 of IS:1554 (Part-I) with latest amendments, following marking shall also be embossed over outer sheath at every three meters:

(i) Cable size and voltage grade.

(ii) Word "PROPERTY OF MP POWER TRANSMISSION COMPANY" and Name of manufacturer.

Besides above Marking for length of Cable at every one meter shall also be done on outer sheath of cable.

The embossing shall be increasive, automatic in line throughout the length of the Cable and shall be legible and indelible.

8.0 PACKING AND MARKING:

Cables shall be supplied in non-returnable wooden drums or steel drums of heavy construction. The surface of the drum and outer most cable layer shall be covered with waterproof layer. Both the ends of the cables shall be properly sealed with heat shrinkable PVC or rubber caps, secured by 'U' nails so as to eliminate ingress of water during transportation storage and erection. Wooden preservative antitermite shall be applied to the entire drums. Wooden drums should comply with latest version of IS:10418 or equivalent International Standards. The following information should be stenciled on the drum:

(i) Reference to relevant Indian or International Standard.

(ii) Manufacturer's name, brand name or trade mark.

(iii) Type of cable and voltage grade.

(iv) Number of cores.

(v) Nominal cross-sectional area of the conductor.

(vi) Cable code.

(vii) Colour of cores.

(viii) Length of cable on the drum.

(ix) Number of lengths on drum (if more than one).

(x) Direction of rotation of drum by means of an arrow.

(xi) Approximate gross weight.

(xii) Running end of cable.

(xiii) Country of manufacturer and Year of manufacture.

9.0 STANDARD DRUM LENGTH:

The control cable should be joint less in each drum. The standard drum length for Copper Control cables shall be as follows;

For 400 KV Substation work	800 Mtrs
For 220 and 132 KV Substation work	500 Mtrs
Power cable	500 Mtrs

10.0 TOLERANCE:

(i) Tolerance on the overall diameter of the Cable shall be ±2 mm over the declared value in the technical data sheets of Guaranteed Technical Particulars.

(ii) The length per drum shall be subjected to maximum tolerance of ±5% of the standard drum length. The purchaser shall have option to reject cable drums with shorter length.

(iii) Over all tolerance in total quantity for each type and size of cables shall be ±2%

11.0 TESTS:

All types and sizes of cables being supplied shall be subjected to Type tests, Additional test, Routine tests and Acceptance tests as specified below at the expense of Supplier and according to relevant standards.

11.1 TYPE TESTS AND ADDITIONAL TESTS:

It is essential to furnish all the type test reports for each type and size of cable as stipulated in latest version of IS:1554 (Part-I) and following Additional tests alongwith the tender:

(i) Loss of mass test

(ii) Heat shock test

(iii) Thermal stability test

(iv) Accelerated water absorption test

(v) Dielectric strength retention test

Above Type/Additional Tests shall be conducted in Government / Reputed Testing Laboratories and shall not be older than 5 Years.

For any change in the design/type, already type tested/tested for additional test and the design/type offered against this tender, the purchaser reserves the right to demand repetition of some or all type tests and additional tests without any extra cost on the first or any one lot of any rating included in the package.

11.2 ACCEPTANCE TEST:

Acceptance tests shall be carried out on each type and size of cables on cable drums selected at random as per following plan:

S. No.	Numbers of drums offered for inspection	Number of drums to be taken as samples
1	Upto 50	2
2	Upto 51 to 100	5
3	From 101 to 300	13
4	From 301 to 500	20
5	Above 501	32

The following shall constitute acceptance tests :

(i) Annealing test (for copper)
(ii) Conductor Resistance test
(iv) Test for thickness of insulation and sheath.
(v) Tensile strength and elongation test at break of insulation and sheath.
(vi) High voltage test (Water immersion test) – a.c. test only
(vii) High Voltage test at room temperature and
(viii) Insulation Resistance test

11.3 ROUTINE TESTS

Routine tests shall be carried out for each drum of cables of all types and sizes. Following shall constitute routine tests :

(i) Conductor Resistance test

(ii) High Voltage Test at room temperature

12.0 INSPECTION:

(i) The purchaser shall have access at all times to the works and all other places of manufacture, where the Cables are being manufactured and the successful Tenderer shall provide all facilities for unrestricted inspection of works, raw materials, manufacture of all the accessories and for conducting necessary tests as detailed in the tender document.

(ii) The successful Tenderer shall keep the purchaser informed in advance of the time of starting and of the progress of manufacture of Cables in its various stages, so that arrangement could be made for inspection.

(iii) No material shall be dispatched from the point of manufacture unless the material has been satisfactorily inspected and tested or pre-despatch inspection has been waived.

(iv) The acceptance of any quantity of the material shall in no way relieve the successful tenderer of his responsibility for meeting all the requirement of this specification and shall not prevent subsequent rejection if such Material are later found to be defective.

13.0 INSPECTION PROGRAMME

13.1 Successful Tenderer shall chalk out a detailed inspection and testing programme for various manufacturing activities. The Purchaser also reserves the right to carryout any tests by a third party at its sole discretion. All Costs of inspection/tests shall be borne by you.

13.2 STAGE INSPECTIONS:

Successful Tenderer shall intimate the detailed manufacturing programme within 30 days from the date of placement of order. The MPPTCL will have a right to depute its inspecting officers during the manufacture of the cable at various stages of manufacturing for Stage Inspections. Purchaser shall normally depute its representative to carry out stage inspections at following stages of manufacturing of cables : -

i. before drawing of conductor
ii. before application of insulation on conductor
iii. before application of inner sheath over laid up cores

Intimation for stage inspections as above for various lots shall be given by you one week in advance to organize deputation of inspecting officer. During stage inspections, the inspecting officer shall verify the sources of raw material, its quality etc. During this stage, following documents shall be verified by our inspector as a proof towards use of raw material for manufacture of Cables ordered by us.

i. Invoice of the supplier
ii. Factory test certificate
iii. Packing list
iv. Bill of lading, if applicable
v. Bill of entry certificate by customs, if applicable

The Purchaser also reserves the right to carry out stage inspections at other stages also, for which advance intimation shall be given and all necessary cooperation shall be rendered by the manufacturer. Only after approval of the purchaser, the supplier shall proceed ahead for manufacturing of the cable. During stage inspection, adherence to the approved Quality Assurance Plan will also be checked.

A complete record of stage inspection shall be kept by you and this record shall be made available for inspection by the representative of the MPPTCL.

14.0 QUALITY ASSURANCE PLAN:

14.1 The Tenderer must establish that they are following a proper quality assurance programme for manufacture of Cables. The Tenderer shall invariably furnish following information alongwith his tender. Information shall be separately given for each type of cable:

(i) Statement giving list of important raw materials, names of sub-suppliers for the raw material, list of standards according to which the raw material is purchased and copies of test certificates thereof.

(ii) Information and copies of test certificates as in (i) above in respect of bought out items.

(iii) List of manufacturing facilities available.

(iv) Levels of automation achieved and list of areas where manual processing exists.

(v) List of areas in manufacturing process, where stage inspections are normally carried out for quality control and details of such tests and inspections.

(vi) List of testing equipment available with the Tenderer for final testing of cable specified and test plant limitation, if any, vis-à-vis type, special, acceptance and routine tests specified in the relevant standards. These limitations shall be very clearly brought out in schedule of deviations from specified test equipments.

14.2 The successful Tenderer shall within 30 days of placement of order, submit following information to the Purchaser:

(i) List of raw material as well as bought out accessories and the names of sub-suppliers selected from the lists furnished along with Tender.

(ii) Type test certificates of the raw materials and bought out accessories.

(iii) Quality Assurance Plan (QAP) with hold-up points for purchaser's inspection. The quality assurance plans and hold-up points shall be discussed between the Purchaser and supplier before the QAP is finalized.

14.3 The successful Tenderer shall submit the routine test certificates of bought out items and for raw material at the time of routine testing of cable.

APPENDIX – A

SIZE OF POWER & COPPER CONTROL CABLE

~~1.1 KV UNARMOURED COPPER CONTROL CABLES~~:

~~19 Core 2.5 Sq mm~~

~~12 Core 2.5 Sq mm~~

~~8 Core 2.5 Sq mm~~

~~4 Core 2.5 Sq mm~~

~~2 Core 2.5 Sq mm~~

1.1 KV ARMOURED COPPER CONTROL CABLES:

19 Core 2.5 Sq mm

12 Core 2.5 Sq mm

4 Core 2.5 Sq mm

4 Core 4 Sq mm

4 Core 10 Sq mm

2 Core 2.5 Sq. mm

ARMOURED ALUMINIUM POWER CABLE:

3.5 Core 300 Sq mm

SCHEDULE – I (A)

DESCRIPTION OF MATERIAL FOR SCHEDULE OF RATES AND PRICES TO BE FURNISHED IN VOLUME -VI

S.No.	Particulars	Qty
~~1.~~	~~1.1KV UNARMOURED COPPER CONTROL CABLES~~	
~~a.~~	~~19 Core 2.5 Sq mm~~	As per Price Schedule
~~b.~~	~~12 Core 2.5 Sq mm~~	
~~c.~~	~~8 Core 2.5 Sq mm~~	
~~d.~~	~~4 Core 2.5 Sq mm~~	
~~e.~~	~~2 Core 2.5 Sq mm~~	
2.	**1.1 KV ARMOURED COPPER CONTROL CABLES:**	
a.	19 Core 2.5 Sq mm	As per Price Schedule
b.	12 Core 2.5 Sq mm	
c.	4 Core 2.5 Sq mm	
d.	4 Core 4 Sq mm	
e.	4 Core 10 Sq mm	
f.	2 Core 2.5 Sq. mm	
3.	**ARMOURED ALUMINIUM POWER CABLE:**	
a.	3.5 Core 300 Sq mm	As per Price Schedule

Note :

1. The above description of material is given for the purpose of offering the prices and to mention description of material in Invoice for claiming payment.
2. The quantity of above material has been mentioned in ~~Volume VI~~ Section-1.

APPENDIX-A

LIST OF STANDARDS
GENERAL

Indian Electricity Rules, Indian Electricity Act, Indian Electricity (Supply) Act, Indian Factories Act

S. No.	Indian Standard Number	Title	International & Internationally Recognised Standards
1	IS-5	Colours for Ready Mixed Paints & Enamels	-
2	IS-335	New Insulating Oils	-
3	IS-617 (P1 to P145)	Aluminium and Aluminium Alloy Ingots and Castings for General Engineering Purposes	-
4	IS-1448 (P1 to P145)	Methods of Test for Petroleum and its Products	-
5	IS-2071 (P1 to P3)	Methods of High Voltage Testing	-
6	IS-12063	Classification of degrees of Protection provided by enclosures of electrical equipment	-
7	IS-2165 1:1997 P2:1983	Insulation Coordination	-
8	IS:3043	Code of Practice for Earthing	-
9	IS-6103	Method of Test for Specific Resistance (Resistivity) of Electrical Insulating Liquids	-
10	IS-6104	Method of Test for Interfacial Tension of Oil against Water by the Ring Method	-
11	IS-6262	Method of Test for Power Factor & Dielectric Constant of Electrical Insulating Liquids	-
12	IS-6792	Method for Determination of Electric Strength of Insulating Liquids	-
13	IS-5578	Guide for Uniform System of Marking & Identification of Conductors & Apparatus Terminals	-
14	IS-11353	Methods for Radio Interference Test on High Voltage	-
15	IS-8263	Methods of Radio Interference Test on High Voltage Insulators	-
16	IS-9924 (Part 1,2 & 4)	Low Voltage Fuses	-
17	-	High Voltage Test Techniques	IEC-60060 (Part 1 to P4)
18	-	Environmental Test	IEC-60068

S. No.	Indian Standard Number	Title	International & Internationally Recognised Standards
19		Graphical Symbols	IEC-60117
20	-	Methods for the Determination of the Electrical Strength of Insulation Oils	IEC-60156
21	-	Partial Discharge Measurements	IEC-60270
22	-	Specification and Acceptance of New Sulphur Hexafluoride	IEC-60376
23	-	Radio Interference Test on High Voltage Insulators	IEC-60437
24	-	Artificial Pollution Tests on High Voltage Insulators to be used on AC Systems	IEC-60507
25	-	Common Sp4cification for High Voltage Switchgear & Control gear Standards	IEC-60694
26	-	Guide for the Selection of Insulators in respect of Polluted Conditions	IEC-60815
27	-	Short Circuit Current – Calculation of effects	IEC-60865 (P1 & P2)
28	-	National Electrical Code	ANSI-C.1/ NFPA.70
29	-	Guide for Surge Withstand Capability (SWC) Tests	ANSI-C37.90A
30	-	Specification for Electromagnetic Noise and Field Strength Instrumentation 10 KHz to 1 GHz	ANSI-C.6321, C63.3
31	-	Techniques for Dielectric Tests	C36.4 ANSI-C68.1
32	-	Standard General Requirements and Test Procedure for Outdoor Apparatus Bushings	ANSI-C76.1/EEE21
33	-	Specification for Sound Level Meters	ANSI-S14
34	-	Drawing Symbols	ANSI-Y32-2/C337.2
34	-	11Gray Finishes for Industrial Apparatus and Equipment No.61 Light Gray	ANSI-Z55.
35	-	General Standards for Industrial Control & Systems Part ICSI-109	NEMA-ICS-II
36	-	Specification for CISPR Radio Interference Measuring Apparatus for the frequency range 0.15 MHz to 30 MHz	CISPR-1
37	-	Quality Assurance Program Requirements	CSA-Z299.1-1978h

S. No.	Indian Standard Number	Title	International & Internationally Recognised Standards
38	-	Quality Control Program Requirements	CSA-Z299.2-1979h
39	-	Quality Verification Program Requirements	CSA-Z299.3-1979h
40	-	Inspection Program Requirements	CSA-Z299.4-1978h
EQUIPMENT-WISE SPECIFICATION			
A) 400KV, 220KV, 132KV & 33KV CIRCUIT BREAKERS:			
1	-	Specification for alternating current circuit breakers	IEC-62271-100-2001
2	-	Specification and acceptance of new supply of SF6	IEC-376
3	IS-1885	Electro technical vocabulary	IEC-50
4	IS-375	Marking and arrangement for switchgear bus-bar, main connections and auxiliary wirings.	-
5	IS-2147	Degree of protection provided for enclosures for low voltage switchgear and control gear.	-
6	IS-325	Specification for three phase induction motors.	-
7	IS-13947	LV Switchgears & control gear.	IEC-947
8	IS-2629	Recommended practice for hot dip galvanizing of iron and steel.	-
9	IS-5	Colour for ready mix paints.	-
10	IS-2099	High voltage porcelain bushings.	IEC-137
11	IS-5561	Electric Power connectors	-
12	IS-2516	Specification for circuit breaker	-
13	-	Synthetic Testing of High Voltage alternating current circuit breakers	IEC-6047
14	-	Pressurised hollow column insulators	IEC-61264
15	IS-13118	Specification for alternating current circuit breakers	IEC-62271-100-2001 & IEC 60056 or latest amendment thereof
B) 400 KV, 220 KV, 132 KV & 33KV C&R PANELS:			
1	IS-3842	Application guide for electric relays for AC system	-
2	IS-3231, 3231 (P-3)	Electric relays for power system protection.	-
3	IS-1885	Electric technical vocabulary electrical relays and Electrical power system protection	IEC 50
4	IS-1248/2419	Indicating instruments	-

S. No.	Indian Standard Number	Title	International & Internationally Recognised Standards
T) COPPER CONTROL AND ALUMINIUM POWER CABLE			
1	IS: 1554	Specification for PVC insulated (Heavy Duty) Control cables for working voltage up to & including 1100 Volts.	-
2	IS: 3961	Recommended current ratings for PVC insulated and PVC sheathed heavy duty cables.	-
3	IS: 3975	Mild steel wires, strings and tapes for armouring of cables.	-
4	IS: 4905	Methods of random sampling.	-
5	IS: 5831	Specification for PVC insulation and sheath of electric cables.	-
6	IS: 8130	Specification for Conductors for insulated electric cables and flexible cords.	-
7	IS: 10418	Specification for Drums for electric cables.	-
8	IS: 10810	Methods of test for cables.	-
U) TUBULAR BUS CONDUCTOR			
1	IS 5082	Specification for wrought Aluminium and Aluminium Alloy bars, Rods, Tubes and sections for electrical purposes.	-
2		Specification for Dimensions of steel pipe for the petroleum industry.	B.S.1600
V)	**ACSR CONDUCTOR**		
1	IS:209	Specification for Zinc	
2	IS:398 Part I to Part V (as relevant)	Specification for Aluminium Conductors for overhead Transmission purpose	
3	IS:1778	Reels and drums for Bare wires	
4	IS:1521	Method of Tensile Testing of Steel wire	
5	IS:2629	Recommended practice for Hot Dip Galvanising Iron and Steel	
6	IS:2633	Method of Testing Uniformity of Zinc coating of Zinc coated Articles.	
7	IS:4826	Galvanised coating on Round Steel wire	
8	IS:6745	Method of Determination of weight of Zinc coating of zinc coated Iron and Steel Articles	
9	IS:8263	Method of Radio Interference Tests	
10	IS:1841	EC Grade Aluminium Rod produced by rolling	

APPENDIX-B

not appear in various schedules and required for successful commissioning of substation shall be included in the bid price and shall be provided at no extra cost to MPPTCL.

16.0 TECHNICAL DEVIATIONS:

In case of any deviation from the requirement indicated in our technical specification then the deviation shall be mentioned explicitly and clearly for respective equipment separately for equipment/material in Schedule-XI **"Volume VI of bid specification"** . While MPPTCL may consider and accept such minor deviations which may not affect overall performance of equipment/system; it may be noted that in case of any major deviation, MPPTCL reserves the right to reject the bid without assigning any reasons.

17.0 BASIC REFERENCE DRAWINGS:

17.1 Single line diagram and general arrangements, drawings are enclosed in Appendix B of this section for reference, which shall be further engineered by the bidder.

17.2 The bidder shall maintain the overall dimensions of the substation/ site, phase to earth clearance, phase to phase clearance and sectional clearances as per enclosed drawings / relevant applicable standards.

The enclosed drawings give the basic scheme, layout of substation, substation buildings, associated services etc. In case of any discrepancy between the drawings and text of specification, the requirements of text shall prevail in general. However, the Bidder is advised to get these clarified from MPPTCL.

17.3 The auxiliary transformers of rating 200 KVA shall be used for AC, 400 V supply at sub-stations.

18.0 SPECIAL TOOLS AND TACKLE:

The bidder shall supply with the equipment one complete set of all special tools and tackles for the erection, assembly, dis-assembly and maintenance of the equipment. However, these tools and tackles shall be separately, packed and brought on to Site.

19.0 QUALITY ASSURANCE PLAN & STAGE INSPECTION:

19.1 The successful bidder shall ensure that for the purpose of supply of equipments, the manufacturer will have to follow strict quality assurance programme, which will include thorough verification of samples of critical assemblies and accessories, verification of sources of raw materials, detailed verification of drawing & design, checking up of relevant calculations, stage inspections at various critical stages of manufacture and minor modifications consequent to such stage inspections as per our requirements and all other related requirements, which have generally been brought out in bidding documents and the detailed contract. It is expected that bidder would be very serious and prudent in meeting these requirements without any loss of time, so that supply of equipments in line with quality assurance programme is ensured within targeted schedule.

The MPPTCL reserves the right to specify various stages for stage inspections and also for manufacture of a proto type unit for inspection & testing, before according clearance for bulk manufacturing.

19.2 The bidder shall ensure that manufacturer must establish that they are following a proper quality assurance programme for manufacture of offered equipments.

The bidder shall ensure that manufacturer invariably furnish following information:-

i. Statement giving list of important raw materials, names of sub supplier for the raw material, list of standards according to which the raw material are tested, list of tests normally carried out on raw material in presence of manufacturers representative, copies of test certificates.

ii. Information and copies of test certificates as in (i) above in respect of bought out items.

iii. List of manufacturing facilities available.

iv. Levels of automation achieved and list of areas where manual processing exists.

v. List of areas in manufacturing process, where stage inspections are normally carried out for quality control and details of such tests and inspection.

vi. Special features provided in the equipment to make it maintenance free.

vii. List of testing equipment available with the manufacturer for final testing of equipment specified and test plant limitations, if any vis-à-vis type, special, acceptance and routine tests specified in the relevant Indian Standards or equivalent international standard. These limitations shall be very clearly brought out in schedule of deviations from specified test equipments.

19.3 The successful bidder shall within 30 days of award of Contract shall arrange following information to the MPPTCL.

i. Quality Assurance Plan (QAP) with hold points for Employer's inspection. The quality assurance plans and holds points shall be discussed between the Employer and Bidder before the QAP is finalized.

19.4 The successful Bidder shall also ensure that the manufacturer submits the routine test certificates of bought out items and for raw material at the time of routine testing of the fully assembled equipment.

20.0 SYSTEM PARAMETERS

S. No.	Description of Parameters	400 KV System	220 KV System	132 KV System	33 KV System
1.	System Operating Voltage	400 KV	220 KV	132 KV	33 KV
2.	Maximum operating voltage of the system (rms)	420 KV	245 KV	145 KV	36 KV
3.	Rated Frequency	50 Hz	50 Hz	50 Hz	50 Hz
4.	No. of phase	3	3	3	3

SECTION-3
Project Details and General Technical Requirements

3.0 GENERAL

This section stipulates the General Technical Requirements under the Contract and will form an integral part of the Technical Specification.
The provisions under this section are intended to supplement general requirements for the materials, equipments 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.

3.1 PROJECT INFORMATION AND SYSTEM PARAMETERS

a)	Customer/ Purchaser/ Owner	Madhya Pradesh Power Transmission Company Ltd.				
b)	Project Title	Construction of new 400 kV sub stations, transmission lines and Augmentation work/feeder bay work on total turn-key basis (Lot no. 1) – Balaghat, Badnawar, Bhopal, Chhegaon and Nagda substation				
c)	Location	Balaghat	Badnawar	Bhopal	Chhegaon	Nagada
		Balaghat is Located in district of Balaghat of Madhya Pradesh. Distance between Jabalpur to Balaghat is 232 km by Road and 130 km by Rails.	Badnawar is Located in district of Dhar of Madhya Pradesh. Distance between Badnawar to Ujain is 70 km by Road.	Bhopal site is located 20 kM away from Bhopal city.	Chhegaon is located in Khandwa district of Madhya Pradesh. Distance between Chhegaon to Khandwa is 15 km by Road.	Nagda is located in Ujjain district of Madhya Pradesh. The road distance between Nagda to Ujjain is 47 km.
d)	Transport Facilities	Road/Rail				

e)	Postal Address	To follow
SITE CONDITIONS		
a)	Maximum ambient air temperature	50°C
b)	Minimum ambient air temperature	1°C
c)	Average daily ambient temperature	35°C
d)	Maximum Relative humidity	95 %(sometimes approach saturation)
e)	Pollution Severity	Heavily Polluted
f)	Seismic level (horizontal acceleration)	0.3g
g)	Wind zone as per IS 802 (PART 1) - 1995velocity	4
h)	maximum wind pressure	150kg/sq.mts
i)	Average annual rainfall	1250 mm
j)	Maximum altitude above mean see level	1000m
k)	Isolceraunic level	90 days per year
l)	Climate	Moderately hot & humid tropical climate, conducive to rust & fungus growth

AUXILIARY POWER SUPPLY

3 phase A.C power supply	415V 50 Hz, 3-phase 4 wire, solidly earthed
1 phase A.C power supply	240V, 50 Hz, 1-phase, 2 wire
D.C. power supply	**220V, 2-wire ungrounded**, for all equipments and panels except PLCC of 400kV /220kV /132kV /33kV substation
D.C. power supply	48V, 2 wire system positively earthed for PLCC

The above supply voltage may vary as below and all devices shall be suitable for continuous operation over entire range of voltage.

i.	AC supply	Voltage + 10 % to -25% , frequency ± 4%
ii.	DC supply	Voltage + 10 % to -20%

SYSTEM PARAMETERS

Description parameters	**400kV System**	**220kV System**	**132kV System**	**33kV System**
System operating voltage	400 kV	220kV	132kV	33kV
Maximum operating voltage(rms)	420 kV	220kV	145kV	36 kV
Rated frequency	50Hz			
Full wave impulse withstand voltage (1.2/50 micro second)	1425kVP	1050kVP	650kVP	250kVP/ 170kVP
One minute Power frequency dry/wet withstand voltage (rms)	630kV/ 520kV	460kV	275kV	95kV/70kV
Switching Impulse withstand voltage (250/2500 micro sec.) dry and wet	1050kVP	-	-	-
Corona extinction voltage	320kV	156kV	105kV	-
Maximum radio interference voltage for frequency between 0.5MHz and 2 MHz at 320kV rms phase for 400kV system , 156kVrms for 220kV system & 92 kV rms for 132kV system	1000 Micro volt	1000 Micro volt	500 Micro volt	-
Rated short time current	40 kA for three seconds/one second as applicable			25 kA for three seconds/2 6.2kA for two second
Creepage distance @25mm/kV	10500mm	6125mm	3625mm	900mm
System Earthing	Effectively Earthed			

3.2 GENERAL TECHNICAL REQUIREMENT

3.2.1 TYPE TESTS

All equipment/systems to be supplied shall conform to type tests as per relevant standards and proven type. The Bidder / Contractor shall furnish the reports of all the type tests carried out in within last **five years from the date of bid opening (i.e. 20.11.13)** 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 Contractor is not able to submit report of type test(s) conducted in last five 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.

3.2.2 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.

3.3 MATERIAL/WORKMANSHIP

3.3.1 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 fulfill 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 modem 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, leveling, 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 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 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 Contractor has any special requirement for the specific application of a type of oil or grease not available in India. In 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 Contractor. The same shall be applicable to other consumables too.

3.3.2 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 favorable to the growth of fungi and mildew. The indoor equipments located in non-air conditioned areas shall also be of same type.

3.4 COLOUR SCHEME AND CODES FOR PIPE SERVICE/PANELS

The contractor shall propose a color 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:

Finishing colour of Indoor equipment

Finishing colour of Outdoor equipment.

Finish colour of all cubicles.

Finishing colour of various auxiliary system equipment including piping

Finishing colour of various building items.

Painting process shall be of powder coating type.All surface shall be cleaned , phosphated and given two coats of rust –resistant primer followed by two coats of finish paints . The interior of all panels cabinets and enclosures shall be finished with gloss white enamel. Two final powder coats of synthetic enamel paint of light grey shade(697 of IS-5) shall be given to exterior surface of all the panels. Sufficient quantities of touch paint shall be furnished for application at site. All The indoor cubicles shall be of same colour scheme and for other miscellaneous items, colour scheme will be approved by the purchaser.

3.5 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.

3.6 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.

3.7 SURFACE FINISH

All interiors and exteriors of tanks, control cubicles and other metal parts shall be throughly 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 paintaing shall be made of corrosion resisting material. All machine finished or bright surfaces shall be coated with a suitable preventive compound and suitabley wrapped or other wise 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. All external painting shall be as per shade no. 697 of IS:5.

3.8 GALVANIZING

All ferrous parts including all sizes of nuts, bolts, Plain and spring washers, support channels, structures, shall be hot dip galvanised conforming to latest version of IS:2629 & or 4759 or any other equivalent authoritative standard. However, hardware less than M12 size shall be electro-galvasized. Minimum weight of zinc coating shall be **610 gm/sq.m** and minimum thickness of coating shall be 85 microns for all items thicker than 6mm. For items lower than 6 mm thickness, requirement of coating shall be as per relevant ASTM.

3.9 PACKING

The following details are to be clearly indicated in the material forwarding documents:

a) Name and address of the consignee.
b) Purchase order number.
c) Name of supplier/s.
d) Description of equipment / material.
e) Net weight.
f) Gross weight.

All the equipments shall be suitably protected, coated, covered or boxed and crated to prevent damage or deterioration during transit, handling and storage at Site till the time of erection. On request of the purchaser, the Contractor shall also submit packing details/associated drawing for any equipment material under his scope of supply, to facilitate the purchaser to repack any equipment/ material at a later date, in case the need arises. Any material found short inside the packing cases shall be supplied by the supplier without any extra cost.The cases containing easily damageable material shall be very carefully packed and marked with appropriate caution symbol i.e. fragile, handle with care, use no Hooks etc.

Mandatory spares shall be packed in separate packing with clear identification.

3.10 HANDLING, STORING AND INSTALLATION

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. 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, contractor shall make all necessary mechanical and electrical connections between sections including the connection between buses. 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.

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 Contractor.The 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 Contractor shall immediately proceed to correct the discrepancy at his risks and costs.

3.11 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-31

c) Installed in covered area IP:52

d) Installed indoor-in non air-conditioned area where possibilities of entry of water is limited:IP-41

e) 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.

3.12 RATING PLATES, NAME PLATES AND LABELS

Type or serial number together with details of the loading conditions under which the item of the substation in question has designed to operate and such diagram plates as may required by the Purchaser. The rating plate of each equipment shall be according to IEC requirements.

All such nameplate instruction plates, rating plates shall be bilingual with Hindi inscription first followed by English. Alternately two separate plates one with Hindi and other with English inscriptions may be provided. All measurements shall be in M.K.S units.

3.13 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.

3.14 TERMINAL BLOCKS AND WIRING

Control and instrument leads from the switchboards or from other equipment will be brought to terminal boxes or control cabinets in conduits. All Inter-phase and external connections to equipment or to control cubicles will be made through terminal blocks.

Terminal blocks shall be **1100 V grade box** –clamp type and have continuous rating to carry the maximum expected current on the terminals. Those shall be of moulded piece complete with insulated barriers stud type terminals, washers nuts and lock nuts. Screw clamp, overall insulated, insertion type, rail mounted terminals can be used in place of stud type terminals. 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.

The terminal shall be that maximum contact area is achieved when a cable is terminated. The terminal shall have a locking characteristic to prevent cable from escaping from the

terminal clamp unless it is done intentionally. The conducting part in contact with cable shall preferably be tinned or silver plated however Nickel plated copper or zinc plated steel shall also be acceptable. The terminal blocks shall be of extensible design. The terminal blocks shall have locking arrangement to prevent its escape from the mounting rails.

The terminal blocks shall be fully enclosed with removable covers of transparent, non deteriorating type plastic material. Insulating barriers shall be provided between the terminal blocks. These barriers shall not hinder the operator from carrying out the wiring without removing the barriers.

Unless otherwise specified terminal blocks shall be suitable for connecting the following conductors on each side.

All circuits except CT circuits :	Minimum of 2 nos. of 2.5 sq.mm, copper flexible.
All CT circuits :	Minimum of 4 nos. of 2.5 sq.mm, copper flexible.

The arrangements shall be in such a manner so that it is possible to safely connect or disconnect terminals on live circuits and replace fuse links when the cabinet is live. **At least 20 % spare** terminals shall be provided on each panel/cubicle/box and these spare terminals shall be uniformly distributed on all terminals rows.

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 Publictions, 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.

3.15 CONTROL CABINETS, JUNCTION BOXES, TERMINALS BOXES AND MARSHALLING BOXES FOR OUTDOOR EQUIPMENTS

All types of boxes, cabinets etc. shall generally conform to and be tested in accordance with IS-5039, IS-8623 or IEC-439, as applicable and the clause given below.

Control cabinet, Junction boxes, Marshalling boxes & Terminal boxes shall be made of **CRCA** sheet steel of minimum 2.5 mm thickness. The thickness of door s/covers shall not be less than 2.5 mm. The box shall be properly braced to prevent wobbling. There shall be sufficient reinforcement to provide level surfaces, resistance to vibrations and

rigidity during transportation and installation. Cabinet/boxes shall be free standing floor mounting type, wall mounting type or pedestal mounting type as per requirements.

Cabinet /boxes shall be provided with double hinged doors with padlocking arrangements. The distance between two hinges shall be adequate to ensure uniform sealing pressure against atmosphere. The quality of gaskets shall be such that it does not get damaged/cracked during the operation of the equipment.

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

3.16 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. The heater shall be installed in the lower portion of the compartment and electrical connections shall be made from below the heater to minimize deterioration of supply wire insulation. The heaters shall be suitable to maintain the compartment temperature to prevent condensation.

The heaters shall be suitably designed to prevent any contact between the heater wire and air and shall consist of coiled resistance wire centered in metal sheath and completely encased in a highly compacted powder of Magnesium Oxide or other material having equal heat conduction and electrical insulation properties, or they shall consist of a resistance wire wound on a ceramic and completely covered with a ceramic material to prevent any contact between the wire and air. Alternatively, they shall consist of resistance wire mounted into a tubular ceramic body built into an envelop of stainless steel or the resistance wire is wound on a tubular ceramic body and embedded in glaze the surface temperature of the heaters shall be restricted to a value

which will not shorten the life of the heater sheaths or that of insulated wire or other component in the compartments.

3.17 QUALITY

BHEL quality plan to be followed subject to TBEM / customer's approval.

3.18 DOCUMENTATION

3.18.1 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 any thing is waived.

All engineering data submitted by the 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.

3.18.2 DRAWINGS

All drawings submitted by the 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 equipments and materials, clearances and spaces required for installation and interconnection between various portions of equipments and any other information specifically requested in the specifications.

Each drawing submitted by the Contractor shall be clearly marked with the name of the Employer, name of consultant ,the unit designation, 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 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 Contractor's risk. The 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 Contractor's drawing or work by the Employer shall not relieve the contractor of any of his responsibilities and liabilities under the Contract.

3.18.3 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 2 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 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 enclosed sheet for details of Title block.

3.18.4 DOCUMENTS TO BE SUBMITTED ALONGWITH OFFER

1) Drawings

2) Guaranteed Technical Particulars

3) Type Test Reports

4) Manufacturing Quality Plan

3.18.5 DOCUMENTATION SCHEDULE

S. No.	DESCRIPTION	TENDER STAGE	CONTRACT STAGE FOR APPROVAL	FINAL DOCUMENTATION	
			Prints	Prints	CDs
1.	Drawings and Data Sheets	1	6	21	7 nos of all drawings/documents
2.	Drawings "As Built "	-	-	21	
3.	Type Test Reports	1	6	21	
4.	Erection Manuals	-	6	21	
5.	Operation and Maintenance Manuals	-	6	21	
6.	Manufacturing Quality Plan	1	6	21	
7.	Field Quality Plan	1	6	21	
8.	Inspection Test Reports	-	-	21	

Soft copies of drawings at contract stage shall also be submitted in **PDF format**.

Drawings will also be submitted in mini cartridges in AUTOCAD Release -14 package or any other CAD package along with conversion files for all major items.

Final Documentation shall be submitted in bound volumes with Customer & Project etc. written on top.

SECTION-4
GUARANTEED TECHNICAL PARTICULARS

SL.NO	PARTICULARS
1.0	**GENERAL :**
I)	Name and address of the Manufacturer :
ii)	Location of factory
2.0	**Cable Type :**
I)	Type and size of cable
ii)	Standard applicable
iii)	Voltage rating
iv)	Permissible variation in voltage, frequency and combined voltage and frequency
v)	Suitable for earthed/unearthed system
3.0	**Conductor and its Hardness :**
I)	Material copper/aluminium (indicating grade)
ii)	Nominal cross sectional area
iii)	Form of conductor circular/shaped
iv)	Minimum No. of strands
v)	Nominal dia. of each strand
vi)	Whether strands are tinned or not
vii)	Temperature co-efficcient of resistance at 20 ^{0}C per ^{0}C
4.0	**Insulation :**
I)	Material (mention type)
ii)	Minimum average thickness
iii)	Tolerance on the smallest of the measured values of thickness of insulation
iv)	Dia. of core over insulation
v)	a) Min. volume resistivity at 27 Deg C b) Min. volume resistivity at 70 Deg C

SECTION-4

GUARANTEED TECHNICAL PARTICULARS

vi) Colour scheme of identificaiton of cores
vii) Average dielectric strength
viii) Suitability with regard to moisture, ozone, acid, oil and alkaline surroundings

5.0 Inner Sheath:

I) Material (mention type)
ii) Whether extruded
iii) Minimum thickness of inner sheath
iv) Calculated diameter over stranded cores of the cables
v) Calculated diameter over inner sheath
vi) Whether the inner sheath and the filling material are suitable for the operating temperature of the cable

6.0 Armour

I) Material
ii) Type
iii) Nominal Diameter of wire
iv) Short Circuit Carrying capacity of Armour (For 1 sec)

7.0 Outer Sheath / Overall Covering :

I) Material (mention type, if any)
ii) Whether extruded
iii) Minimum average thickness (mm)
iv) Tolerance on the smallest of the measured values of thickness of outer sheath
v) Calculated dia under sheath (mm)
vi) Wheather anti-termite treatment has been given in the outer sheath
vii) Outer sheath tested for FRLS properties

SECTION-4
GUARANTEED TECHNICAL PARTICULARS

8.0 Electrical Properties :

I) Maximum DC conductor resistance at 20 ^{0}C

II) Maximum permissible conductor temperature :

a) Under continuous full load

b) Under transient conditions

iii) Loss tangent at normal frequency

iv) Reactance at 50 c/s per Km at 50 ^{0} C

v) Capacitance at 50 c/s per Km.

vi) Current rating (A)

a) In air (continuous)

b) Reference ambient temperature for the above

c) Short circuit current rating for 1 sec. Duration (kA)

vii) Derating factor for an ambient temperature of 50^{0}C

9.0 Mechnaical Data :

i) Overall dia of the cable (mm)

ii) Tolerance in overall diameter (mm)

iii) Weight of cable per km.

iv) Total volume of non-metallic material cm$^{3/}$m

v) Total weight of non-metallic material in kg/m

vi) Drum length

vii) Tolerance on drum length

viii) Total weight of the drum

ix) Dimensions of the drum

x) Recommended minimum installation radius

xi) Maximum safe pulling force

SECTION-5

CHECK LIST FOR INFORMATION TO BE FURNISHED WITH OFFER RETURN THIS CHECKLIST AS PART OF THE OFFER DULY SIGNED

The offer may not be considered if the following information and this Checklist are not enclosed with the Offer.

BHEL ENQUIRY. NO:

BIDDER OFFER REFERENCE:

A)

(1)	(2)	(3)	(4)	(5)
S.No.	**Parameters**	**Data**	**Yes / No**	**Remarks in case reply in Col (4) is *NO***
1.0	**Applicable Standard**	**Latest IS -1554, 5831, 8130, 7098, 3975, 613, ASTM-D2843, ASTM-D2863, IEC60754, IEC60332, IS3961, IS 10418, SS4241475, NEMA WC-70, IEEE-383; For screened cables, standards mentioned in Annexure-1B, Section-1.**		
2.0	**Type**	**FRLS**		
3.0	**Construction feature for PVC Control and Aux Power cable**			
3.1a	Material of Conductor for Control cables	~~Plain Annealed, High Conductivity, Stranded, untinned Copper, Grade EC~~ As per Section-2, Cl. No. 5.1 and 5.1.1		
~~3.1b~~	~~Material of Conductor for Screened Cable~~	~~High Conductivity, Annealed bare copper, Electrolytic grade, Strands: 7x0.3mm (nom)~~		
3.2	Material of Conductor for Power cables	Stranded Aluminium, Grade H2 /H4		
3.3	Conductor Insulation for Control and Power cables	As per Section-2		
~~3.4a~~	~~Conductor insulation for *Screened Control Cable*~~	~~PVC Type Y13 (Insulation Thickness suitable for 1.1kV Voltage class as per relevant standards)~~		

(1)	(2)	(3)	(4)	(5)
S.No.	**Parameters**	**Data**	**Yes / No**	**Remarks in case reply in Col (4) is *NO***
~~3.4b~~	~~Shielding for *Screened Control Cable*~~	~~Al- Mylar Tape~~ ~~a) Individual Pair Shielding: 28 Micron Thickness (Min.)~~ ~~b) Overall cable assembly Shielding : 55micron Thickness (min)~~		
3.4c	~~Drain Wire for *Screened Control Cable*~~	~~For individual & Overall Shield:~~ ~~7 Strand, 20 AWG (0.51sq.mm) annealed Tin coated copper~~		
3.5	Inner sheath	Extruded PVC, Type ST-1		
3.6a	Armouring for Control Cables	~~Galvanised Steel Round wire /formed wire for multicore cables~~ As per Section-2, Cl. No. 5.7		
~~3.6b~~	~~Armouring for Screened Control Cable~~	~~Galvanised Steel Round wire~~		
3.7	Armouring for Aux Power Cables	~~Aluminium round wire for Single core~~ ~~And~~ ~~Galvanised Steel round wire/formed wire for Multi-core cables~~ As per Section-2, Cl. No. 6.0		
3.8a	Outer sheath for Control and Power cables	PVC extruded, FRLS, Type ST-1, Category C2		
~~3.8b~~	~~Outer sheath for *Screened Control Cable*~~	~~PVC extruded, FRLS, Compound YM1~~		
~~**4.0**~~	~~**Construction feature for XLPE Aux Power cable**~~			
~~4.1~~	~~Material of Conductor for Power cables~~	~~Stranded Aluminium, Grade H2 /H4~~		
~~4.2~~	~~Conductor Insulation~~	~~XLPE~~		
~~4.3~~	~~Inner sheath~~	~~Extruded PVC, Type ST2~~		

(1)	(2)	(3)	(4)	(5)
S.No.	**Parameters**	**Data**	**Yes / No**	**Remarks in case reply in Col (4) is *NO***
~~4.4~~	~~Armouring for Aux Power Cables~~	~~Aluminium round wire for Single core~~ ~~And~~ ~~Galvanised Steel round wire/formed wire for Multi-core cables~~		
~~4.5~~	~~Outer sheath~~	~~PVC extruded, FRLS, Type ST-2, Category C2~~		
5.0	**FRLS properties of Outer sheath**			
5.1	Minimum Oxygen index	29		
5.2	Minimum Temperature index	250°C		
5.3	Acid gas emission	Max 20% by weight		
5.4	Smoke density rating	Max 60%		
6.0	**Tolerance on overall diameter**	**± 2mm**		
7.0	**Chemicals added to outer sheath to protect from rodent, vermin and termite attack**	**Yes**		
8.0	**Drum lengths**	**As per Section-2**		
9.0	**Tolerance on total quantity**	**± 2%**		
10.0	**Minimum bending radius for multicore cables**	**12 x D**		

(1)	(2)	(3)	(4)	(5)
S.No.	**Parameters**	**Data**	**Yes / No**	**Remarks in case reply in Col (4) is *NO***
11.0	**Core Identification**	By colour coding as per IS 1554 (Part-I)/ IS 7098 Part-I for the cables upto five (5) cores; and for the cables with more than five (5) cores, by printing legible Hindu Arabic numerals on all cores as per Clause 10.3 of IS 1554 (Part-1).		
12.0	The fillers and inner sheaths shall be of non-hygroscopic, fire retardant material, shall be softer than insulation and outer sheath shall be suitable for the operating temperature of the cable	**Yes**		

B) TYPE TESTS

i) Whether valid type test reports of all the tests as per relevant IS including additional tests mentioned in this specification, conducted earlier on **each type and size of cables** are available (test reports shall be of the tests conducted in Government/Reputed Testing Laboratories and shall not be older than 5 (five) years prior to the date of bid opening). **(YES)**

ii) If valid type test reports are not available with bidder / test reports are not acceptable to BHEL/Customer, then above tests shall be conducted by the bidder free of cost.

(YES)

C)

(1)	(2)	(3)
S.No.	**Description**	**Confirmation of Supplier**
1.	Bidder to confirm that at all drawings / data sheets/QP/ valid type tests reports/ all relevant information shall be submitted to BHEL for organising approval of ultimate customer.	

Date:

Signature of the authorized representative of Bidder

Company Seal