Enquiry

Bharat Heavy Electricals Limited
Transmission Business Group
Materials Management

Project : PGCIL KARAIKUDI PUGALUR KALVINTHAPATTU ABHISHEKAPATTY

Enquiry No	Enquiry Dt	Rev No	Rev Dt	PI No	Enquiry Type	Inspection by	Due Dt	Commercial Comments	Technical Comments	Signing Authority
333E300	21-Dec-13	0		342230185	Package		21-Jan-14	As per BHEL TBG GTC as enclosed with tender.	As per Technical specification no. TB-362-316-016.	ENGINEER/TIMM

Document Enclosed

- Technical Specifications
- Terms & Conditions for Indigenous Enquiry
- Activity Schedule
- Schedule of Information (checklist) to be furnished
- Schedule of Commercial Deviation
- Schedule of Technical Deviation

SN	Equipment	Phy Unit	Qty	Plan Dt	Comments
1	OVER HEAD CONDUCTORS - ACSR MOOSE	KM	35.1	31-Jan-14	DETAILED QUANTITIES ARE GIVEN UNDER "ADDITIONAL INFORMATION" GIVEN BELOW . QTY VARIATION +/- 10% DURING CONTRACT STAGE .
2	ACSR moose conductor as per specification TB-362-316-016 (Karaikudi-7.8km, Pugalur -14.0km, Kalivanthapattu- 10.5km, Abhishekpatty -2.8km)	km	35.1		

You are requested to submit your most competitive offer so as to reach us positively by the tender opening date & time. THE TENDERS NOT RECEIVED WITHIN SCHEDULED DATE AND TIME ARE LIKELY TO BE IGNORED. BHEL shall not be responsible for any postal delay.

IN YOUR OWN INTEREST YOU ARE ADVISED TO CAREFULLY READ "THE INSTRUCTIONS TO BIDDERS". INCOMPLETE BIDS AND/OR BIDS NOT COMPLYING WITH TENDER CONDITIONS SHALL BE TREATED AS NON RESPONSIVE AND ARE LIKELY TO BE IGNORED.

In case Tender Documents are not received within 7 days of this E-mail message, intimate BHEL accordingly. If no intimation is received, it will be considered that you have received tender enquiry and delay in submission offer due to late receipt of tender documents will not be entertained.

YOU ARE REQUESTED TO SUBMIT YOUR MOST COMPETITIVE OFFER SO AS TO REACH US POSITIVELY BY 2 PM ON THE TENDER OPENING DATE AND TENDER WILL BE OPENED AT 2:30 PM WITH EFFECT FROM 15-SEP-09.

BHEL RESERVES THE RIGHT TO OPT FOR REVERSE AUCTION FOR OBTAINING BEST PRICES.

OFFERS THROUGH E-MAIL / FAX:

WHOSOEVER DESIRES TO SEND OFFERS ON THEIR OWN RISK (COMPLETE IN ALL RESPECTS) VIA E-MAIL or FAX HAVE TO SEND THE OFFERS TO THE COMMON E-MAIL ADDRESS tenderbox@bhel.in or 0120-6748581 FAX .

THE RECEIVED EMAIL OFFERS WILL BE PRINTED BY PURCHASE COORDINATOR AND PUT THEM INTO COVERS AS PER CONVENTIONAL METHOD FOR TENDER OPENING I.E., TECHNO COMMERCIAL & PRICE OFFER SHALL BE PUT INTO TWO SEPARATE COVERS AND BOTH THE COVERS ARE KEPT IN THIRD COVER DULY SUPER SCRIBING ENQY. NO. AND DUE DATE.

OFFERS SENT TO ANY OTHER E-MAIL ID or FAX NO AND INCOMPLETE OFFERS SHALL NOT BE CONSIDERED FOR EVALUATION PURPOSE.

It is suggested that the bidders are advised to send the files with 'password protection'. procedure for giving a password to a file has been given below:

For saving Excel file with password

Steps to be followed:

1. Click on the FILE option in XP system and Start sign in Vista system then go to SAVE AS option.
2. Select the location to save and Click on the TOOLS box and go to GENERAL OPTION.
3. It will ask for the password, type the password into open or modify box or both as required.
4. Then click on the OK button it will ask for reenter of the password.
5. After reentering the password click on the save box.

For saving Word file with password

Steps to be followed:

1. Click on the FILE option in XP and Start sign in Vista then go to SAVE AS option.
2. Select the location to save and Click on the TOOLS box and go to SECURITY OPTION in XP system and GENERAL OPTION in Vista system.
3. It will ask for the password, type the password into open or modify box or both as required.
4. Then click on the OK button it will ask for reenter of the password.
5. After reentering the password click on the save box.

The venders who has sent offers with password,the passwords are to be forwarded to another email id:supplierinfo@bhelindustry.com

MSME STATUS

"THOSE INDUSTRIES WHO HAVE FILED A MEMORANDUM WITH THE CONCERNED AUTHORITIES AND REGISTERED AS MICRO & SMALL ENTERPRISE UNDER MICRO, SMALL AND MEDIUM ENTERPRISES DEVELOPMENT ACT 2006, HAVE TO SUBMIT A COPY OF SUCH REGISTRATION CERTIFICATE / MEMORANDUM TO BHEL FOR NECESSARY COMPLIANCES OF THE ABOVE ACT".

Please acknowledge the receipt of tender enquiry and fax back this letter by ticking the appropriate item below.

21/12/13

for BHARAT HEAVY ELECTRICALS LTD

We acknowledge the receipt of tender.

(a) The offer against subject enquiry shall be submitted by the scheduled date and time.

(b) We regret to quote. The item in reference is out of our manufacturing range.

(c) We regret because of our prior commitments.

(d) Any other reason.

To
Rajiv Ranjan
Dy Manager
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 BudhNagar,U.P

Ph: 0120-6748575
Fax: 0120-6748581

Signature and Seal of Tenderer

Enquiry No : 333E300 **Enquiry Dt :** 21-Dec-13

PQR

1. **The material shall be as per our Technical Specification No. TB-362-316-016 Rev-00 .**

2. **The Vendor /Manufacture should have valid MQP number approved by PGCIL.**

Annexure to GTC (BHEL/TBG/GTC/02-07) (for Indian Vendors only)

Enquiry No. 333E300 Dated 21.12.13

Mentioned clauses of General Terms and Conditions are to be read as follows:

Clause 1:

2. Bid submission time: up to 02:00 PM of the due date of opening

3. Bid opening time: 02:30 PM on the same day.

Clause 2: PRICES
A.1.: Not applicable

A.2.: Applicable

B.1.: Applicable

B.2. Not Applicable.

B.3. Not applicable

Clause 3: TERMS OF PAYMENT
100% payment along with taxes, duties, Freight & Insurance within 60 days from the date of receipt of invoice. The invoice must contain following documents in 3 sets (Original + 2 copies).

- Receipted LR
- Excise invoice (if applicable)
- Delivery Challan or Packing list (casewise)
- Transit insurance certificate from under writers or Copy of Intimation of Transit Insurance duly endorsed by under writers,
- MICC issued by BHEL,
- Guarantee certificate,
- copy of Performance Bank Guarantee
- All Test reports and inspection reports, (Not to be given to Finance)

Cont to Page 2

Annexure to GTC (BHEL/TBG/GTC/02-07) (for Indian Vendors only)

Enquiry No. 333E300 Dated 21.12.13

Clause 16: ARBITRATION

The arbitration shall be under **'The Arbitration and Conciliation act 1996'.**

For said/subject procurement, 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.

Proposed Loading for commercial deviation will be as per annexure-1.

All remaining terms which are not mentioned here shall remain unchanged.

Note-

1. Proposed delivery plan is as follows: 31th -JAN-2014.

However vendor has to quote their best delivery plan in activity schedule.

2. Supplier has to specifically indicate/ tick mark their preference for Performance Bank Guarantee out of the three options mentioned in clause no.6 of the General terms and conditions (BHEL/TBG/GTC/02-07).

Annexure to GTC (BHEL/TBG/GTC/02-07) (for Foreign Vendors only)

Enquiry No. 333E300 Dated 21.12.13

Mentioned clauses of General Terms and Conditions are to be read as follows:

Clause 1:

2. Bid submission time: upto 02:00 PM of the due date of opening

3. Bid opening time: 02:30 PM on the same day.

Clause 2: PRICES

A.1.: Not applicable

A.2.: Applicable

B.1.: Applicable.

B.2. Not Applicable.

B.3. Not applicable

Clause 3: TERMS OF PAYMENT

100% payment along with taxes, duties, Freight & Insurance within 60 days from the date of receipt of invoice. The invoice must contain following documents in 3 sets (Original + 2 copies).

- Receipted LR
- Excise invoice (if applicable)
- Delivery Challan or Packing list (casewise)
- Transit insurance certificate from under writers or Copy of Intimation of Transit Insurance duly endorsed by under writers,
- MICC issued by BHEL,
- Guarantee certificate,
- copy of Performance Bank Guarantee
- All Test reports and inspection reports,

LR to be read as Bill of Lading/AWB.

Clause 16: ARBITRATION

The arbitration shall be under **'The Arbitration and Conciliation act 1996'.**

Cont to Page 2

Annexure to GTC (BHEL/TBG/GTC/02-07) (for Foreign Vendors only)

Enquiry No. 333E300 Dated 21.12.13

For said/subject procurement, 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.

Proposed Loading for commercial deviation will be as per annexure-1.

All remaining terms which are not mentioned here shall remain unchanged.

Note-

1. Proposed delivery plan is as follows: 31th -JAN-2014..
   However vendor has to quote their best delivery plan in activity schedule.
2. Supplier has to specifically indicate/ tick mark their preference for Performance Bank Guarantee out of the three options mentioned in clause no.6 of the General terms and conditions (BHEL/TBG/GTC/02-07).

3. Price Break up should consist of the following breakup :-
   a- FOB port of Loading.
   b- Marine Freight from load port to discharge port i.e. any Indian port.
   c- Marine Insurance from load port to discharge port i.e. any Indian port.

   Marine Freight and Insurance to be quoted separately.

   BHEL may arrange Marine Shipment or exercise option for shipment by vendor at quoted F&I rates.

   Freight & Insurance from discharge port to site – BHEL's scope. Rates will be based on BHEL's applicable rate contract for arriving at landed cost to BHEL. However vendor may also quote for the same.

   Freight and Insurance to be quoted separately.

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

This Format is to be submitted in original duly signed 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 may not be accepted.

Sr. No	Terms & Conditions Enquiry No. 333E300Dated 21.12.2013
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, otherwise offer may be rejected. 2. Bidder must ensure that their quotation is received / dropped in the tender box on or before 10.00 AM of the due date of opening in **Tower A, 5TH FLOOR, ADVANT NAVIS IT BUSINESS PARK,** **PLOT No-7, Sector-142, EXPRESSWAY NOIDA,** **NOIDA-201305,** **DISTT- GAUTAM BUDH NAGAR, UP** 3. The same shall be opened at 10.30 AM on the same day. Tenders received late may be rejected. Bidders sending tenders by courier or post, to ensure that it is delivered one day before as same day delivery may not reach above office by due time. 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) is also to be enclosed in Part I bid. 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. 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. 5. For any Technical clarification, please contact Mr. VYOM (ENGINEER-TBEM) BHEL, Noida Phone : 0120-6748522 e-mail : **vyom@bhel.in** For any commercial clarification please contact person issuing enquiry. 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. Enquiry condition for where the scope against this tender includes Installation and Commissioning of the equipment / material

There will be separate contract awarded for Supply portion and Site execution portion. For Supply portion General Terms and Conditions mentioned here shall be applicable for Site execution portion, Terms and conditions for Installation services shall be applicable. However, any breach in either of the contract shall be deemed as the breach of other contract also.

2. PRICES:

<RELEVANT OPTION TO BE SELECTED BEFORE ISSUE OF ENQUIRY>

A.1. Unless specifically indicated, all prices shall be **FIRM.** No enhancement of rate for whatever cause unless and until asked by BHEL will be allowed.

A.2. PVC (if indicated)

The prices to be quoted are with **PVC** with following formula.

As enclosed sheet for ACSR Moose Conductor .

The base indices in the formula shall be applicable on 01.12.13 as per CACMAI Circular dated 02.12.13.

The date of delivery shall be PO delivery date or date of actual despatch, whichever is earlier.

B The prices shall be quoted by the vendors considering following.

B.1. Unless specifically indicated, the prices shall be on **Domestic basis.**

B.2. Deemed export (if indicated)

i) Prices are to be quoted considering following benefits:

1. ----------
2. ----------
3. ----------

ii) For availing above benefits, BHEL shall provide following documents.

1. ----------
2. ----------

iii) In case of import benefit in deemed export projects, bidder to indicate import content (CIF value) in the price bid.

B.3. Physical export (if indicated)

i) Prices are to be quoted considering following benefits

1. ----------
2. ----------

ii) For availing above benefits BHEL shall provide following documents

1.
2.

C. 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 as applicable is to be quoted as percentage in both un-price and

price bid.

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.

e) Entry tax / Octroi Charges: Any Entry tax / Octroi applicable at destination / destination state shall be paid extra on proof of such payment.

f) Freight & Insurance: Freight and Transit Insurance for door delivery up to destination/store is to be quoted.

g) Type Test charges: If asked in the technical specification, is to be quoted separately for each Test along with taxes and duties applicable on them.

h) Erection / Commissioning supervision charges: If asked in the technical specification, to be quoted separately along with taxes and duties applicable on them.

Note : The purchase order shall be placed on Ex-works basis.

3. TERMS OF PAYMENT :

<RELEVANT OPTION TO BE SELECTED BEFORE ISSUE OF ENQUIRY>

For BOIs (non package items)

100% payment along with taxes, duties, Freight & Insurance within 60 days from the date of receipt of invoice. The invoice must contain following documents in 3 sets (Original + 2 copies).
- Receipted LR
- Excise invoice (where ED re-imbursement is required)
- Delivery Challan / Packing list (casewise)
- Transit insurance certificate from under writers or Copy of Intimation of Transit Insurance duly endorsed by under writers,
- Despatch Clearance given by BHEL,
- Guarantee certificate,
- All Test reports and inspection reports,
- Performance Bank Guarantee copy.

For BOPs : Air-Conditioning & Ventilation, Fire Protection, Illumination, Oil handling system where ETC is in scope of bidder

a. 90% of Ex-works value alongwith 100% taxes, duties, Freight & Insurance within 60 days from the date of receipt of invoice. The invoice must contain following documents in 3 sets (Original + 2 copies)
- Receipted LR / RR
- Excise invoice (where ED re-imbursement is required)
- Delivery Challan / Packing list (casewise)
- Transit insurance certificate from under writers or Copy of Intimation of Transit Insurance duly endorsed by under writers,
- Despatch Clearance given by BHEL,
- Guarantee certificate,
- All Test reports and inspection reports,
- Performance Bank Guarantee copy.

b. 5% of Ex-works value on completion of supplies as per billing breakup.

Sr. No	Terms & Conditions Enquiry No. 333E300Dated 21.12.2013
	c. 5% of Ex-works value on successful completion of Erection, Testing, Commissioning (To be certified by BHEL site) and final documentation (Against proof of submission to Engineering) Note: When ETC is not in scope last 5% as per (c) above shall be paid alongwith (b). <u>Terms of payment for Type test charges:</u> 100% payment with taxes and duties on acceptance of test reports by BHEL on certification by BHEL engineering within 60 days from the date of receipt of clear invoice. <u>Terms of payment for Supervision charges:</u> 100% payment against completion with taxes and duties on certification by BHEL site within 60 days from the date of receipt of clear invoice.
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. **<FOLLOWING TO BE DELETED IN ALL ENQUIRY OTHER THAN ILLUMINATION PACKAGE>** However for Illumination system after commissioning Lamps, Tubes, Ballast, Starters, Capacitors, Fuses will not be covered in Guarantee.
6.	**PERFORMANCE BANK GUARANTEE :** **<PBG CLAUSE TO BE REMOVED BEFORE ISSUE OF ENQUIRY FOR ITEMS FOR WHICH PBG IS NOT REQUIRED>** Bidder shall furnish along with first invoice Performance BG / deposit as per one of following 3 options. <u>Option A</u> A single rolling Bank Guarantee of Rs 20 lakhs initially valid for one year for all the orders being executed for Transmission Business Group, BHEL. <u>Option B</u> BG for 10% of the total Ex-works PO value, valid for 18 months from the date of last delivery and 3 months claim period extra, over and above 18 months. PO value at the time of first invoice for the particular order shall be considered for calculation of BG amount. <u>Option C</u> 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 21 months from the date of last delivery. <u>Note</u> : For Shield wire, Earthing material, Cable gland, Cable Trench material, GI/PVC pipe, Hardwares, Al tube, MS Rod, Lable & phase colour disc, HG Fuse, Ferrule, Lug, Marker, Stationary, Office eqpt. and any petty / sundry purchase no Performance bank guarantee is required. 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.
7.	**FINAL ENGINEERING DOCUMENTATION:**

Sr. No	Terms & Conditions Enquiry No. 333E300Dated 21.12.2013
	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 / customer / third party shall inspect equipment / material before despatch. Stage inspection during manufacturing may also be carried out. Material to be despatched only after getting Despatch Clearance from BHEL. Supplier shall send inspection call on prescribed format (web site) only, with an advance notice of 15 days.
9.	**DESPATCH DOCUMENTS :** Following despatch documents are to be immediately sent to purchaser on despatch. - Copy of LR - Copy of delivery challan / packing list - Insurance certificate - Guarantee certificate
10.	**DELIVERY PERIOD:** Bidder to specify delivery period in weeks from the date of LOI / PO. 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 5% 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. PO shall be placed separately for each project.
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 with prior intimation to bidder.
16.	**ARBITRATION :** All cases of disputes emanating from and relating to this contract, the matter shall be referred to the sole arbitration of Unit Head / GM, BHEL or any other person (including an employee of BHEL, even though he had to deal with the matter relating to this contract in any manner) nominated by him to act as sole arbitrator. The arbitration shall be under 'The arbitration and contract act 1996' and the rules there under as amended from time to time. The arbitrator may from time to time with the consent of the parties enlarge the time for making and publishing the award. The venue of arbitration shall be any Indian city as decided by BHEL.
17.	**LEGAL SETTLEMENT :** All suits/claims in respect of this contract shall be in the courts having jurisdiction at New Delhi
18.	**SUBCONTRACTING :**

Sr. No	Terms & Conditions Enquiry No. 333E300Dated 21.12.2013
	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:** If by reason of war, civil commotion, act of god, Government restrictions, strike, lockout which are not in control of supplier the deliveries are delayed, supplier shall not be held responsible.
22.	**MSME:** MSE suppliers can avail the intended benefits only if they submit along with offer, attested copies of either EM II certificate having deemed validity (Two years from the date of issue of acknowledgement in EM-II) or valid NSIC certificate or EM II certificate along with CA certificate (Format enclosed) applicable for the year, certifying quantum of investment in plant and machinery within the permissible limit as per the act for relevant status (Micro or small) were the deemed validity of EM II is over. Date to be reckoned for determining the deemed validity will be the last date of technical bid submission. Non submission of such documents will lead to consideration of their bids at par with other bidders and MSE status of such suppliers shall be shifted to Non MSE supplier till the supplier submits these documents

Signature of Bidder
Seal

PRICE ADJUSTMENT FOR ACSR/AAC CONDUCTOR

The formula for calculating the price adjustment to be applied to the Ex. Works price component of ACSR Moose Conductor shall be as follows:

ACSR Moose Conductors

$$dEC_1 = EC_1 \times \left[0.65 \times \frac{(A_1 - A_0)}{A_0} + 0.15 \times \frac{(B_1 - B_0)}{B_0} + 0.05 \times \frac{(L_1 - L_0)}{L_0}\right]$$

Where,

dEC_1 = Price adjustment amount on Ex. Works price of ACSR Conductor for respective conductors and for each shipment.

EC_1 = Ex. Works price for ACSR Conductor shipment-wise.

A = Price for EC grade Aluminium Ingots (Basic Average price per MT for Ingots), as published by the Cable and Conductor Manufacturer's Association of India, New Delhi (CACMAI).

B = Price for High Tensile Steel Galvanized Wire (HTSG Wire – 3.53 mm, as published by CACMAI.

L = All India Average Consumer Price Index for Industrial Workers (Base 2001 = 100) as published by Labour Bureau, Shimla – 171 004 (Govt. of India, Ministry of Labour).

Subscript "0" refers to the base indices corresponding to 30 days prior to date of opening of bid.

Subscript "1" refers to indices as on 60 days prior to date of shipment.

NOTE:

1. The price adjustment of Ex. Works price component of ACSR/AAC Conductor shall not be subject to any ceiling.
2. If price adjustment amount works out to be positive, the same will be payable to supplier and if it works out to be negative, the same will be recovered from supplier.
3. The supplier will be asked to submit price adjustment invoice after dispatch of material (positively within one month), whether such adjustment is positive or negative.

SCHEDULE OF COMMERCIAL DEVIATION

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

SL. NO.	CLAUSE NO. OF GENERAL TERMS AND CONDITION	STATEMENT OF DEVIATION

- In case, this schedule is not submitted, it will be presumed that the equipment/ material to be supplied under this contract is deemed to be in compliance with the 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 scheduled.

Signature of the authorized representative of

Place: - ……

Bidder's name:……

Date: - ……

Designation……

Company Seal:……

SCHEDULE OF TECHNICAL DEVIATION

The following are the deviations/ variations exception from the Specification:

SECTION	CLAUSE NO. / PAGE NO.	STATEMENT OF DEVIATION/ VARIATIONS/EXCEPTIONS

- In case, this schedule is not submitted, it will be presumed that the equipment/ material to be supplied under this contract is deemed to be in compliance with the 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 scheduled.

Signature of the authorized representative of

Place: - ……

Bidder's Name :……

Date: - ……

Designation:……

Company Seal:……

ACTIVITY SCHEDULE

(SEPARATE ACTIVITY SCHEDULE TO BE FILLED-UP FOR EACH PROJECT BY THE SUPPLIER)

Sl. NO.	ACTIVITY	ACTIVITY TIME IN WEEKS	CUMULATIVE TIME IN WEEKS FROM LOI / PO DATE	REMARKS IF ANY
1.	Submission of Documents necessary for getting manufacturing clearance like Drawings, Date sheet etc.			
2.	Approval of documents from BHEL / Customer *			
3.	Manufacturing time			
4.	Inspection call			
5.	Customer Inspection & Despatch Clearance			
6.	Arrangement for Dispatch			

Note: 1) * Supplier must ensure the completeness and correctness of the requisite documents before submission for approval. Delay in approval on account of incomplete/inadequate information shall be the responsibility of supplier.

2) Inspection call should be given in the prescribed format only. Inspection calls not in the prescribed format shall not be entertained.

3) Qty. to be offered for Inspection should be in accordance within Delivery- schedule - lot BHEL reserves the right not to entertain multiple inspection calls for a Delivery- lot and delay on this account shall be the responsibility of Supplier.

Signature of Supplier
Date

Sr. No	Loading proposed
1	**TERMS OF PAYMENT :**
	If a bidder asks for payment within specified no. of days from receipt of material at site, loading as following to be done :(Standard payment terms as per P-5 to be put in GTC) 0-29 days – 2% on total ex-works value 30-59 days – 1% on total ex-works value 60 days or more – no loading
2	**GUARANTEE :**
	If the offered Guarantee period is less than the tender guarantee period, the ex-works prices shall be loaded for the 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). [2.5% is taken same as BHEL's corporate norms for complaint reserve (contractual obligation)]
3	**DELAYED DELIVERY / PENALTY 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.

Un-Priced SCHEDULE (For Indian vendors only) (Part II)

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

ENQUIRY NO:333E300 Dtd: 21.12.2013

S.No.	Description of Item	Unit	Quantity	Unit Price Ex-works	Total Ex-Works	Unit F & I	Total F & I	*ED @____ % of Col6*	CST / ST @____% of (Col 6+9)	TOTAL (FOR Destination) PRICE (Rs.)
1	2	3		5	6	7	8	9	10	11
1	OVERHEAD CONDUCTOR ACSR MOOSE as per Technical Specification No. TB-362-316-016 for KARAIKUDI SITE	KM	7.8							
2	OVERHEAD CONDUCTOR ACSR MOOSE as per Technical Specification No. TB-362-316-016 for PUGALUR SITE	KM	14							
3	OVERHEAD CONDUCTOR ACSR MOOSE as per Technical Specification No. TB-362-316-016 for KALIVANTHAPATTU SITE	KM	10.5							
4	OVERHEAD CONDUCTOR ACSR MOOSE as per Technical Specification No. TB-362-316-016 FOR ABHISHEKPATTY SITE	KM	2.8							

NOTE: 1.VENDOR TO INDICATE APPLICABLE LOCAL TAX/VAT WITHOUT AS ANY CONCESSIONAL FORMS FOR TRANSACTION WITHIN THE STATE.LOCAL TAX/VAT_____

2. PLEASE NOTE THAT UNPRICED COPY OF PRICE BID (i.e. WITH ALL PRICE BLANKED) SHALL BE FURNISHED ALONGWITH TECHO-COMMERCIAL BID.

3. REQUIRED COPIES OF FORMAT BE MADE & DETAILS MAY BE ANNEXED.

4. THE PRICES MUST BE QUOTED IN THE PRESCRIBED UNIT ONLY.

5.IN CASE OF CST RATE AGAINST 'C' FORM SHALL BE QUOTED.

TENDERER

SCHEDULE OF PRICE (For Foreign vendors only) (Part II)

Unpriced price bid to be kept with Techno-commercial offer. **Price bid should be kept in separate sealed cover.**

ENQUIRY NO: 333E300 Dtd: 21.12.13

A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	
	Name of item	Tariff No.	Qty	Unit-CIF {Indian Sea port)}	Total -CIF {Indian Sea port)}.	Break up of CIF(Indian 'Any' Sea port) rates						Breakup of Inland Transportation			
						Unit -FOB (Load port).	Total -FOB (Load port).	Unit-Sea Freight (upto indian Discharge port)	Total-Sea Freight (upto indian Discharge port)	Unit-Insurance(upto indian Discharge port)	Total-Insurance(upto indian Discharge port)	Unit-Freight (from Indian Discharge port to site)	Unit-Insurance (from Indian Discharge port to site)	Total-Freight (from Indian Discharge port to site)	Total-Insurance (from Indian Discharge port to site)
			KM												
1	OVERHEAD CONDUCTOR ACSR MOOSE as per Technical Specification No. TB-362-316-016 for KARAIKUDI SITE		7.8												
2	OVERHEAD CONDUCTOR ACSR MOOSE as per Technical Specification No. TB-362-316-016 for PUGALUR SITE		14												
3	OVERHEAD CONDUCTOR ACSR MOOSE as per Technical Specification No. TB-362-316-016 for KALIVANTHAPATTU SITE		10.5												
4	OVERHEAD CONDUCTOR ACSR MOOSE as per Technical Specification No. TB-362-316-016 FOR ABHISHEKPATTY SITE		2.8												
	Total														

NOTE-

Discharge Port:- Indian Sea Port (Any Indian port)

CIF (indian port) should be equal to "FOB(load port) + Sea Freight (upto indian Sea port) +Insurance(upto Indian Sea port)"

Load port to be mentioned by bidder .

No of package with Dimensions and type of cargo(/Break Bulk/LCL/FCL) and no. of container (with type of container) required-Is also to be mentioned by bidder.

Vendor has to mention tarrif no. against each item for custom duty purpose.

Bidder has to mention quoted (in each cell) in unpriced price bid

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.

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 on date..... 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

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.

Date:

(Signature)

Name -

Membership number -

Seal of Chartered Accountant

(36)

BHARAT HEAVY ELECTRICALS LIMITED

TRANSMISSION BUSINESS ENGINEERING MANAGEMENT

NEW DELHI

DOCUMENT No.	TB-362-316-016	Rev	00		Prepared	Checked	Approved
CUSTOMER Doc. No.				NAME	VK	NK	MK
TYPE OF DOC.	TECHNICAL SPECIFICATION			SIGN			
TITLE	Moose conductor			DATE			
				GROUP	TBEM		
				W.O. No			
CUSTOMER	POWER GRID CORPORATION OF INDIA LIMITED						
PROJECT	400kV Bay Extension at Karaikudi, Pugalur, Kalivanthapattu and Abhishekpatty Substation						

List of Contents — No. of Pages

Rev.	Date	Altered	Checked	Approved	REVISION DETAILS
00					First Issue

Distribution	CUSTOMER	TBMM	O/C	
	-	4	1	

SECTION – I

SCOPE, SPECIFIC TECHNICAL REQUIREMENT AND QUANTITIES

1.0 SCOPE

This technical specification covers the requirements of design, manufacture, testing at works, packing and dispatch of ACSR Moose Conductor.

The equipment is required for the following project.

Name of the Customer: POWER GRID CORPORATION OF INDIA LIMITED (PGCIL)

Name of the Project: 400kV Bay extension at Karaikudi, Pugalur, Kalivanthapattu and Abhishekpatty substation

1.2 BILL OF QUANTITY

Sl. No	Description	Unit	Karaikudi	Pugalur	Kalivan-thapattu	Abhishek-patty
i	**ACSR Moose Conductor**	Km	7.8	14.0	10.5	2.8

(Qty. variation ±10%) Kpur

1.3 TYPE TESTS

Bidder shall submit valid type test reports (as per relevant IEC/IS Standard) for approval. The type test reports submitted shall be of tests conducted within last 10 years prior to the date of bid opening i.e. 17.05.13. The bidder should have conducted type test on identical or similar equipment/ components to those offered. In case type test reports are found to be technically unacceptable to BHEL/PGCIL, the type test shall be conducted without cost and delivery implication to BHEL.

Bidder shall submit following type test reports :-

1. UTS test
2. Corona extinction voltage test (dry)
3. Radio interference voltage test (dry)
4. DC resistance test

1.4 QUALITY PLAN

Bidder to follow valid POWERGRID approved Quality Plan as per POWERGRID procedure. In case the bidder don't have PGCIL approved QP, it will be the bidder's responsibility to get its QP approved directly from the ultimate customer.

1.5 Project title block:-

Customer:	POWER GRID CORPORATION OF INDIA LIMITED
Project:	400kV Bay extension at Karaikudi, Pugalur, Kalivanthapattu and Abhishekpatty substation
NOA no.:	CC-CS/380-SR2/SS-2049/3/G4/NOA-I/4713 dated 28.06.2013
Work order no.	83002

(33)

SECTION – II

STANDARD TECHNICAL SPECIFICATION

2.1 This section covers the standard technical requirements of the ACSR MOOSE Conductor. In case of any discrepancies between the requirements mentioned in this section and those specified in other sections of this specification, the later shall prevail and shall be treated as binding requirements.

2.2 TECHNICAL REQUIREMENTS

1. Conductor type : ACSR
2. Commercial name item : MOOSE

2.2.1 The details of the conductor are tabulated below:

a)	Stranding and wire Diameter in mm	54/3.53 mm Al+7/3.53 Steel
b)	Number of strands	
	Steel center	1
	1st steel layer	6
	1st Aluminium layer	12
	2nd Aluminium layer	18
	3rd Aluminium layer	24
c)	Sectional area of aluminium	528.5 mm^2
d)	Total sectional area	597.00 mm^2
e)	Overall diameter	31.77 mm
f)	Approximate weight	2004 kg/km
g)	Calculated d.c. resistance at 20°C	0.05552 ohm/km
h)	Minimum UTS	161.2kN
i)	Drum Length	As required, generally 1500 – 1800m

2.2.2 The details of **aluminium strand** are as follows:

i)	Minimum breaking load of strand - before stranding - after stranding	 1.57kN 1.49kN
ii)	Max. D.C. resistance of strand at 20°C	2.921 ohm/km

2.2.3 The details of steel strand are as follows:

i)	Minimum breaking load of strand - before stranding - after stranding	 12.86 kN 12.22 kN
ii)	Minimum number of twist to be withstood in torsion test when tested on a gauge length of 100 times diameter of wire	18-before stranding 16-after stranding

2.3 APPLICABLE STANDARDS

The ACSR MOOSE Conductor shall strictly conform to the following Indian and International standards, as appropriate:

IS 398 (Part-V): 1992 Aluminium conductors galvanized Steel reinforced

IS 2629:1990	Recommended practice for hot dip galvanizing on iron and steel.
IS 4826:1992	Hot dip galvanized coatings on round steel wires
IS 2633:1992	Method for testing uniformity of coating of zinc--coated articles.
IS 6745: 1990	Methods for determination of mass of Zinc coating on zinc coated iron and steel articles
IS 8263:1990	Methods for radio interference test
IS 1778:1980	Reels and drums for bare conductors
IS 1521:1991	Method for tensile testing of steel wire

2.4 TECHNICAL REQUIREMENT AND CONSTRUCTIONAL DETAILS

2.4.1 The finished conductor shall be smooth, compact, uniform and free from all imperfections including spills and splits, die marks, scratches, abrasion, scuff marks, kinks (protrusion of wires), dents, press marks, cut marks, wire cross over, over riding, looseness (wire being dislocated by finger/hand pressure and/or unusual bangle noise on tapping), material inclusions, white rust, power formation or black spots (on account of reaction with trapped rain water etc.), dirt, grit etc.

2.4.2 All the aluminium and steel strands shall be smooth, uniform and free from all imperfections, such as spills and splits, die-marks, scratches, abrasions and kinks after drawing.

2.4.3 The steel strands shall be hot dip galvanized and shall have a minimum Zinc coating of 260 gm/m^2 after stranding of the uncoated wire surface. The zinc coating shall be smooth, continuous and of uniform thickness, free from imperfections and shall withstand minimum three dips after stranding in standard Preece Test. The finished strands and the individual wires shall be of uniform quality and have the same properties and characteristic as prescribed in ASTM designation: B 498-74.

2.4.4 The steel strands shall be preformed and post-formed in order to prevent spreading of strands in the event of cutting of composite core wire. Care shall be taken to avoid damage to galvanization during pre-forming and post-forming operation.

2.5 Joints in wires

2.5.1 Aluminium wires

No joints shall be permitted in the individual wires in the outermost layer of the finished conductor. However, joints in the 12 wire and 18 wire inner layers of the conductor shall be allowed but these joints shall be made by cold pressure butt welding and shall be such that no such joints are within 15 metres of each other in other in the complete stranded conductor.

2.5.2 Steel wires

There shall be no joint of any kind in the finished wire entering into the manufacture of the strand. There shall also be no strand splices in any length of the completed stranded steel core of the conductor.

2.6 Tolerances

The manufacturing tolerances to the extent of the following limits only shall be permitted in the diameter of individual aluminium and steel strands and lay-ratio of the conductor.

a) Diameter of aluminium and steel strands (in millimeters):

	Standard	Maximum	Minimum
Aluminium	3.53	3.55	3.51
Steel	3.53	3.60	3.46

b) Lay ratio of conductor:

		Maximum	Minimum
Steel	6-wire layer	18	16
Aluminium	12-wire layer	14	12
	18-wire layer	13	11
	24-wire layer	12	10

2.7 Materials

2.7.1 Aluminium

The aluminium strands shall be hard drawn from electrolytic aluminium rods having purity not than 99.5% and a copper content not exceeding 0.04%

2.7.2 Steel

The steel wire strands shall be drawn from high carbon steel wire rods and shall conform to the following chemical composition:

Element	-	**% composition**
Carbon	-	0.50 to 0.85
Manganese	-	0.50 to 1.10
Phosphorous -	-	not more than 0.035
Sulphur	-	not more than 0.045
Silicone	-	0.10 to 0.3

2.7.3 Zinc

The zinc used for galvanizing shall be electrolytic high grade zinc of 99.95% purity. It shall conform to and satisfy all the requirements of IS: 209-1979.

2.8 Standard length

The conductor shall be supplied in lengths as required generally in the range of 1500/ 1800 metres.

2.9 Tests:

2.9.1.A The conductor should have type tested as per IEC/IS and shall be subjected to routine and acceptance tests in accordance with applicable IS specifications/ISO/ASTMA recommendations. If the valid type test reports are not available with the bidder than the test shall be conducted by the bidder free of cost.

2.9.1.B If the purchaser insists to carry out the type test(s) afresh, the same shall be conducted on chargeable basis, fo that bidder shall submit the test charges in the price bid.

2.9.1.C TYPE TESTS

In accordance with the stipulation of the specification the following type tests shall be conducted on the conductor:

a)	UTS test	As per clause No. 2.10.1 below (The number of samples shall be mutually agreed)
b)	Corona extinction voltage test (dry)	As per clause No. 2.10.2 below
c)	Radio interference voltage test (dry)	As per clause No. 2.10.3 below
d)	DC resistance test	As per clause No. 2.10.4 below

2.9.2 Acceptance tests: Tests to be conducted

a)	Visual check for joints, scratches, etc. and lengths of conductor	As per clause No. 2.10.7 below
b)	Dimensional check on strands	As per clause No. 2.10.8 below
c)	Check for lay ratio of various layers	As per clause No. 2.10.9 below
d)	Galvanizing test on steel strands	As per clause No. 2.10.10 below
e)	Torsion and elongation test on steel strands	As per clause No. 2.10.11 below
f)	Breaking load test on strands	As per clause No. 2.10.12 below

In addition wrap test on steel and aluminium strands, dc resistance test on aluminium strands and UTS test on welded joint of aluminium strands shall be carried out as per clauses 12.5.2,12.7& 12.8 respectively of IS:398 (part V)1982.

NOTE:

All the above tests except test mentioned at (a) shall be carried out on aluminium and steel strands after stranding only.

2.9.3 Routine tests: Tests to be conducted

a) Check to ensure that the joints are as per specification.
b) Check that there are no cuts, fins etc. on the strands
c) All acceptance test as mentioned in clause 2.9.2 above to be carried out on each coil.

2.9.4 Tests during manufacture

a)	Chemical analysis of zinc used for galvanizing	As per clause No. 2.10.5
b)	Chemical analysis of aluminium used for making aluminium stands	As per clause No. 2.10.6
c)	Chemical analysis of steel used for making steel strands	As per clause No. 2.10.6

2.9.5 Sample batch for type testing

The contractor shall offer material for selection of samples for type testing, only after getting quality assurance plans approved from owner's quality assurance department. The sample shall be manufactured strictly in accordance with the quality assurance plan approved by owner.

2.10 TESTING PROCEDURE FOR ACSR MOOSE CONDUCTOR

2.10.1 UTS Test on Stranded Conductor

Circles perpendicular to the axis of the conductor shall be marked at two places on a sample of conductor of minimum 5 m length suitably compressed with dead end clamps at either end. The load shall be increased at a steady rate up to 80 kN and held for one minute. The circles drawn shall not be distorted due to relative movement of strands. Thereafter the load shall be increased at a steady rate to 161.2 kN and held for one minute. The applied load shall then be increased until the failing load is reached and the value recorded.

2.10.2 Corona Extinction Voltage Test

Two samples of conductor of 5m length shall be strung with a spacing of 450 mm between them at a height not exceeding 8.0 m above ground. This assembly shall be tested as per Section 3, corona extinction voltage shall not be less than 320kV (RMS) Line to ground for 400 kV system.

2.10.3 Radio Interference Voltage Test

The sample assembly similar to that specified above shall be tested as per Section 3. Maximum RIV level (across 300 ohm resistor at 1 MHz) at 305 kV (RMS) line to ground voltage shall be 1000 μV.

2.10.4 D.C Resistance Test on Stranded Conductor

On a conductor sample of minimum 5 m length two contact clamps shall be fixed with a pre-determined bolt torque. The resistance shall be measured by a Kelvin double bridge by placing the clamps initially zero meter and subsequently one meter apart. The test shall be repeated at least five times and the average value recorded.

The value obtained shall be corrected to the value at 20^0C as per clause no. 12.8 of IS:398 (Part V)-1982.The resistance corrected at 20^0C shall conform to the requirements of this specification.

2.10.5 Chemical Analysis of Zinc

Samples taken from the zinc ingots shall be chemically/spectrographically analysed. The same shall be in conformity to the requirements stated in this specification.

2.10.6 Chemical Analysis of Aluminium and Steel

Samples taken from the Aluminium ingots/ coils/ strands shall be chemically/ spectrographically analyzed. The same shall be in conformity to the requirements in this specification.

2.10.7 Visual Check for Joints, Scratches etc.

Conductor drums shall be rewound in the presence of the inspector. The inspector shall visually check for scratches, joints, etc. and that the conductor generally conforms to the requirements of this specification. The length of conductor wound on the drum shall be measured with the help of counter meter during rewinding.

2.10.8 Dimensional Check for steel and Aluminium Strands.

The individual strands shall be dimensionally checked to ensure that they conform to the requirements of this specification.

2.10.9 Check for Lay –ratios of various Layers.

The lay-ratios of various layers shall be checked to ensure that they conform to the requirements of this specification and clause no. 9.4 and 9.5 of IS-398 (Part-V) 1982.

2.10.10Galvanising Test

The test procedure shall be as specified in IS: 4826-1968. The material shall conform to the requirements of this specification.

2.10.11Torsion and Elongation Tests on Steel Strands

The test procedures shall be as per relevant clauses of IS 398 (Part V): 1982. In torsion test, the number of complete twists before fracture shall not be less than 18 on a length equal to 100 times the standard diameter of the strand before stranding & 16 after stranding. In case test sample length of less or more than 100 times the standard diameter of the strand, the minimum number of twist will be proportionate to the length and if number comes in the fraction then it will be rounded off to next higher whole number. In elongation test, the elongation of the strand shall not be less than 4% for a gauge length of 200 mm.

2.10.12Breaking load test on welded Aluminium stand:

Two Aluminium wires shall be welded as per the approved quality plan and shall be subjected to tensile load. The welded point of the wire shall be able to with stand the minimum breaking load of the individual strand guaranteed by the bidder.

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SECTION-3

PROJECT DETAILS & GENERAL SPECIFICATION

SITE INFORMATION

	Particular	Details			
a)	Customer	**Power Grid Corporation of India Limited**			
b)	Project Title	400kV Bay extension at Karaikudi, Pugalur, Kalivanthapattu and Abhishekpatty substation			
c)	Site	Karaikudi	Pugalur	Kalivanthapattu	Abhishekpatty
d)	Name of state	Tamilnadu	Tamilnadu	Tamilnadu	Tamilnadu
e)	Nearest rail head	Karaikudi	Pugalur	Chennai	Tirunelveli
SITE CONDITIONS					
a)	Altitude above sea level	Less than 1000m	Less than 1000m	Less than 1000m	Less than 1000m
b)	Ambient air temp. (Max)	50°C	50°C	50°C	50°C
c)	Special corrosion conditions	No	No	Yes See note below	No
d)	Snow fall	Nil	Nil	Nil	Nil
e)	Seismic zone	As per IS 1893			
f)	Wind zone	As per IS 875 (also see note below)			
g)	Pollution Severity	High Pollution level (25mm/kV)	High Pollution level (25mm/kV)	Very High Pollution level (31mm/kV)	High Pollution level (25mm/kV)

Note:-

Following additional requirements shall be met for Kalivanthapattu substion extension:

1) All switchgears/ equipments, insulator strings, bushings, BPIs shall be designed for minimum creepage distance of 31mm/kV instead of 25mm/kV for other three stations.
2) The rate of zinc coating for galvanized lattice and pipe structures (excluding foundation bolts and fasteners) shall not be less than 900gm/sq. m instead of 610gm/sq. m for other three stations.
3) Outdoor atmosphere around the substation is highly polluted coupled with coastal pollution. Suitable paint and corresponding primers etc. as recommended by paint manufacturer shall be used to withstand the outdoor atmospheric condition.

4) Kalivanthapattu substation falls under high wind zone and basic wind speed shall be considered as 50m/sec.

1.0 GENERAL

This Chapter covers Technical Requirements and requirements of auxiliary items.

a) Equipment furnished shall be complete in every respect with all mountings, fittings, fixtures and standard accessories normally provided with such equipment and/or needed for erection, completion and safe operation of the equipment as required by applicable codes unless included in the list of exclusions.

b) Material and components not specifically stated in this specification but which are necessary for satisfactory operation of the equipment and accessories specified in this specification shall be deemed to be included unless specifically excluded and shall be supplied at no extra cost.

c) Whenever a material or article is specified or described by the name of a particular brand, manufacturer or vendor, the specific name mentioned shall be understood as establishing type, function and quality and not as limiting competition.

d) In case any Deviation Schedule, Bid Proposal Sheet, Schedule of Data Requirements (DRS), test reports or any other document/information are not furnished along-with the bid, the bid is liable to be rejected. Unless brought out clearly, the Bid will be deemed to conform to the specification scrupulously. All deviations from the specification shall be clearly brought out in the respective deviation schedule.

e) Auxiliary supplies as described below would be available at site.

Normal Voltage	Variation in Voltage	Frequency in HZ	Phase/Wire	Neutral connection
415V	± 10%	50 ± 5%	3/4 Wire	Solidly Earthed.
240V	± 10%	50 ± 5%	1/2 Wire	Solidly Earthed.
220V	190V to 240V	DC	-	Isolated 2 wire System
110V	95V to 120V	DC	-	Isolated 2 wire System
48V	_	DC	_	2 wire system (+) earthed

NOTE: Combined variation of frequency and voltage shall be limited to

±10 %.

f) The Bidder shall clearly indicate in the bid, the specific standards in accordance with which the works will be carried out.

g) The equipment must be new, of highest grade, the best quality of their kind, to best engineering practice and latest state of art, and in accordance with purpose for which they are intended and ensure satisfactory performance throughout the service life.

h) All similar parts of the equipment shall be made to gauge and shall be interchangeable with and shall be made of same materials and workmanship as the corresponding parts of the equipment. Where feasible, common components, units shall be employed in different pieces of equipment in order to optimize the spare part stock-up and utilization.

i) The requirement regarding external RIV as specified for equipment shall include the terminal fittings and the equipment shall have been tested preferably with fittings, if any.

j) All drawings, schedules, annexures appended to this specification shall form part of the specification.

2.0 SERVICES TO BE PERFORMED BY THE EQUIPMENT BEING FURNISHED

a) The equipment furnished under this specification shall perform all its functions and operate satisfactorily without showing undue strain, restrike etc.

b) The equipment shall be able to withstand forces due to wind load, short circuit, system over voltages, fluctuations, frequency variations etc., all forces considered together.

3.0 SUPPORT STRUCTURES

a) The support structures should be hot dip galvanised with minimum 610 gram/m^2 net of zinc.

b) The design calculations taking into account the environmental conditions of the substations shall be furnished for sizing of the structures.

4.0 STANDARDS

a) The equipment to be furnished under this specification shall conform to latest issue with all amendments of standard specified under respective Chapters of this Specification. The Bidder shall note that standards mentioned in the specification are not mutually exclusive or complete in

themselves, but intended to compliment each other. The Contractor shall also note that list of standards presented in this specification is not complete. Whenever necessary the list of standards shall be considered in conjunction with specific IS/IEC. When the specific requirements stipulated in the specifications exceed or differ than those required by the applicable standards, the stipulation of the specification shall take precedence.

b) Other internationally accepted standards which ensure equivalent or better performance than that specified in the standards referred shall also be accepted.

c) In case governing standards for the equipment is different from IS or IEC, the salient points of difference shall be clearly brought out in additional information schedule alongwith English language version of standard or relevant extract of the same. The equipment conforming to standards other than IS/IEC shall be subject to Employer's approval.

5.0 ENGINEERING DATA AND OTHER REQUIREMENTS

5.1 The furnishing of engineering data by the Contractor shall be in accordance with the Schedule for each set of equipment as specified in this Technical Specification and the data furnished under the Schedule of Data Requirements (DRS). The review of these data by the Employer will cover only general conformance of the data to the specifications and documents, interfaces with the equipment provided under the specifications, external connections and of the dimensions which might affect overall layout. This review by the Employer may not indicate a thorough review of all dimensions, quantities and details of the equipment, materials, any devices or items indicated or the accuracy of the information submitted. This review and/or approval by the Employer shall not be considered by the Contractor, as limiting any of his responsibilities and liabilities for mistakes and deviations from the requirements, specified under these specifications and documents.

5.2 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 these specifications shall be performed in strict conformity, unless otherwise explicitly requested by the Employer in Writing.

5.3 The equipment offered shall also comply to the following:-

a) To facilitate erection of equipment, all items to be assembled at site shall be "match marked".

b) The reports for all type tests and additional type tests as per technical specification shall be furnished by the Contractor alongwith equipment / material drawings. The type tests conducted earlier should have either been

conducted in accredited laboratory (accredited based on ISO / IEC Guide 25 / 17025 or EN 45001 by the national accredition body of the country where laboratory is located) or witnessed by the representative(s) of POWERGRID or Utility. The test reports submitted shall be of the tests conducted within last 5 (five) years prior to the date of bid opening. In case the test reports are of the test conducted earlier than 5 (five) years prior to the date of bid opening, the contractor shall repeat these test(s) at no extra cost to the purchaser.

In the event of any discrepancy in the test reports i.e. any test report not acceptable due to any design / manufacturing changes (including substitution of components) or due to non-compliance with the requirement stipulated in the Technical Specification or any/all additional type tests not carried out, same shall be carried out without any additional cost implication to the Purchaser.

c) The Purchaser intends to repeat the type tests and additional type tests on Capacitors for which test charges shall be payable as per provision of contract. The price of conducting type tests and additional type tests shall be included in Bid price and break up of these shall be given in the relevant schedule of Bid Proposal Sheets. These Type test charges would be considered in bid evaluation. In case Bidder does not indicate charges for any of the type tests or does not mention the name of any test in the price schedules, it will be presumed that the particular test has been offered free of charge. Further, in case any Bidder indicates that he shall not carry out a particular test, his offer shall be considered incomplete and shall be liable to be rejected.

d) Four (4) copies of all test reports shall be submitted for approval before shipment of equipment. The reports shall indicate clearly the standard values specified for each test, to facilitate checking of the test reports. Six (6) bound copies of test reports shall be submitted after approval of test results.

e) Six (6) copies of documentation of test certificate/ test result alongwith the relevant drawing (wherever applicable) from the raw material stage to final stage as per approved Quality Plan (QP) will be furnished by supplier for each and every equipment immediately after shipment of equipment.

f) 1 RTF and 8 copies of all drawings for each substation plus 6 copies and one RTF of each drawing for corporate office shall be furnished after approval of drgs. 6 copies of instruction/operation manuals for each substation and corporate centre shall also be furnished after approval of manuals.

g) The following program shall be followed for approval of drawings/manuals :

i. Initial comments/approval by Employer within 4 (four) weeks of receipt of drawings.

ii. Resubmission of drawings/manuals within 4 (four) weeks of comments (including both ways postal time).

iii. Approval of drawings/manuals within 3 weeks of receipt of resubmission. Within 21 days of approval, stipulated number of copies and reproducibles in case of drgs shall be furnished by Contractor.

NOTE : The contractor may please note that all resubmissions must incorporate all comments given in the prior submission by the Employer failing which the submission of documents is likely to be returned.

h) Six (6) No. of copies of drawings, Schedule of Data Requirements (DRS) and other documents shall be sent for approval. First submission shall be made within 4 weeks of LOA.

i) All exposed ferrous parts shall be hot dip galvanised as per IS : 2633 & IS : 4579.

j) All current making and breaking contact surfaces shall preferably be silver plated.

k) The equipment name plate/ wiring diagram plate should preferably be of stainless steel. In case of aluminium it should be atleast 2 mm thick. The inscription on the name plate/wiring diagram plate shall be engraved and no punching shall be accepted except for equipment Sr. No. and year of manufacture.

l) Each drawing submitted by the Contractor shall be clearly marked with the name of the Employer, the unit designation, the specifications title, the specification number and the name of the Project. If standard catalogue pages are submitted, the applicable items shall be indicated therein. All titles, notings, markings and writings on the drawing shall be in English. All the dimensions should be in metric units.

m) 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.

n) All manufacturing and fabrication work in connection with the equipment prior to the approval of the drawings 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 of work by the engineering shall not

relieve the contractor of any of his responsibilities and liabilities under the Contract.

SYSTEM PARAMETERS

Sl. No.	Description of parameter	400kV	132kV
1	System Operating Voltage	400kV	132kV
2	Max. operating Voltage of the system (rms)	420kV	145kV
3	Rated Frequency	50Hz	50Hz
4	No. of Phases	3	3
5	Rated Insulation level		
i)	Full wave impulse withstand voltage(1.2/50 microsec)	1550Vp	650kVp
ii)	Switching impulse withstand voltage (250/2500 microsec)	1050kVp	
	Dry and wet		
iii)	One minute power frequency dry withstand voltage (rms)	630	275
6	Corona extinction voltage	320kV	105
7	Max. Radio interference voltage for frequency between 0.5Mhz and 2 MHz at 266kV rms for 400kV and 156kV rms for 220kV system	1000microvolts	500 micro volt
8	Minimum creepage distance (25mm/kV)	10500mm	3625mm
9	Min Clearance		
i)	Phase to phase	4000mm (for conductor-conductor) configuration 4200mm (for rod-conductor configuration)	1300mm
ii)	Phase to Earth	3500mm	1300mm
iii)	Sectional clearance	6500mm	4000mm
10	Rated short circuit current for 1 sec duration	40kA	40kA
11	System neutral earthing	Effectively earthed	Effectively earthed

6.0 DESIGN IMPROVEMENTS

6.1 The Employer or the Contractor may propose changes in the specification of the equipment or quality thereof and if the parties agree upon any such changes, the specification shall be modified accordingly.

6.2 The Bidder should however note that changes proposed by him will have to be supported with applicable type test reports.

6.3 If any such agreed change is such that it affects the price and schedule of completion, the parties shall agree in writing as to the extent of any change in the price and/or schedule of completion before the Contractor proceeds with the change. Following such agreement, the provision thereof, shall be deemed to have been amended accordingly.

7.0 QUALITY ASSURANCE PROGRAMME

7.1 To ensure that the equipment and services under the scope of this Contract whether manufactured or performed within the Contractor's Works or at his Sub-contractor's premises or at the Employer's site or at any other place of Work are in accordance with the specifications, the Contractor shall adopt suitable quality assurance programme to control such activities at all points necessary. Such programme shall be outlined by the Contractor and shall be finally accepted by the Employer after discussions before the award of Contract. A quality assurance programme of the contractor shall generally cover the following :

a) His organisation structure for the management and implementation of the proposed quality assurance programme.

b) System for Document and Data Control.

c) Qualification and Experience data of Bidder's key personnel.

d) The procedure for purchases of materials, parts components and selection of sub-contractor's services including vendor analysis, source inspection, incoming raw material inspection, verification of material purchases etc.

e) System for shop manufacturing and site erection controls including process controls and fabrication and assembly control.

f) System for Control of non-conforming products including Deviation Dispositioning, if any and system for corrective and preventive actions based on the feed back received from the Customers and also internally documented system for Customer complaints.

g) Inspection and test procedure both for manufacture and field activities.

h) System for Control of calibration of testing and measuring equipment and the indication of calibration status on the instruments.

i) System for indication and appraisal of inspection status.

j) System of Internal Quality Audits and Management review and initiation of corrective and Preventive actions based on the above.

k) System for authorising release of manufactured product to the Employer.

l) System for maintenance of records.

m) System for handling storage and delivery.

n) A quality plan detailing out the specific quality control measures and procedure adopted for controlling the quality characteristics relevant to each item of equipment furnished and /or service rendered.

o) System for various field activities i.e. unloading, receipt at site, proper storage, erection, testing and commissioning of various equipment and maintenance of records". In this regard, the Employer has already prepared Standard Field Quality Plan for Switchyard Civil Works Document Code No. CC/QA&I/SFQP/SS/03/970905/Rev.1 which is required to be followed for associated civil works. Field Quality Plan pertaining to receipt, storage, erection, testing and commissioning shall be mutually discussed and agreed upon before placement of order.

The Employer or his duly authorised representative reserves the right to carry out quality audit and quality surveillance of the system and procedure of the Contractor/his vendor's quality management and control activities.

7.2 **Quality Assurance Documents**

The Contractor shall be required to submit the following Quality Assurance Documents.

i) All Non-Destructive Examination procedures, stress relief and weld repair procedure actually used during fabrication, and reports including radiography interpretation reports.

ii) Welder and welding operator qualification certificates.

iii) Welder's identification list, listing welder's and welding operator's qualification procedure and welding identification symbols.

iv) Raw Material test reports on components as specified by the specification and/or agreed to in the quality plan.

v) The manufacturing Quality Plan indicating Customer Inspection Points (CIPs) at various stages of manufacturing as mutually agreed upon, and methods used to verify that the inspection and testing points in the quality plan were performed satisfactorily.

vi) Stress relief time temperature charts.

vii) Factory test results for testing required as per applicable codes/mutually agreed quality plan/standard referred in the specifications.

viii) Stress relief time temperature charts/oil impregnation time temperature charts.

8.0 INSPECTION, TESTING & INSPECTION CERTIFICATE

8.1 The Employer, his duly authorised representative and/or outside inspection agency acting on behalf of the Employer shall have at all reasonable times access to the Contractor's premises or Works and shall have the power at all reasonable times to inspect and examine the materials and workmanship of the Works during its manufacture or erection and if part of the Works is being manufactured or assembled at other premises or works, the Contractor shall obtain for the Employer and for his duly authorised representative permission to inspect as if the works were manufactured or assembled on the Contractor's own premises or works. The equipment if found unsatisfactory as to workmanship or material is liable to be rejected.

8.2 The Employer reserves the right to witness any or all type, acceptance and routine tests specified for which at least 30 days notice in advance shall be given by the Contractor. Contractor shall ensure before giving notice for type test that all drawings and quality plans have been got approved. The equipment shall be dispatched to site only after approval of Routine and Acceptance test results and Issuance of Dispatch Clearance in writing by the Employer.

8.3 The Contractor shall give the Employer/Inspector Twenty one (21) days written notice of any material being ready for testing far each stage of testing as identified in the approved quality plan as customer inspection point. Such tests shall be to the Contractor's account except for the expenses of the Inspector. The Employer/inspector, unless witnessing of the tests is waived, will attend such tests within Twenty one (21) days of the date of which the equipment is notified as being ready for test/inspection, failing which the Contractor may proceed with the test which shall be deemed to have been made in the Inspector's presence and he shall forthwith forward to the Inspector six copies of tests, duly certified.

8.4 The Employer or Inspector shall, within Twenty (21) days from the date of inspection as defined herein give notice in writing to the Contractor, of any

objection to any drawings and all or any equipment and workmanship which in his opinion is not in accordance with the Contract. The Contractor shall give due consideration to such objections and shall either make the modifications that may be necessary to meet the said objections or shall confirm in writing to the Employer/Inspector giving reasons therein, that no modifications are necessary to comply with the Contract.

8.5 When the factory tests have been completed at the Contractor's or Sub-Contractor's works, the Employer/Inspector shall issue a certificate to this effect within fifteen (15) days after completion of tests but if the tests are not witnessed by the Employer/Inspector, the certificate shall be issued within fifteen (15) days of receipt of the Contractor's Test certificate by the Employer/Inspector. Failure of the Employer/Inspector to issue such a certificate shall not prevent the Contractor from proceeding with the Works. The completion of these tests or the issue of the certificate shall not bind the Employer to accept the equipment should, it, on further tests after erection, be found not to comply with the Contract.

8.6 In all cases where the Contract provides for tests whether at the premises or works of the Contractor or of any Sub- Contractor, the Contractor except where otherwise specified shall provide free of charge such items as labour, materials, electricity, fuel, water, stores, apparatus and instruments as may be reasonably demanded by the Employer/Inspector or his authorised representative to carry out effectively such tests of the equipment in accordance with the Contract and shall give facilities to the Employer/Inspector or to his authorised representative to accomplish testing.

8.7 The inspection and acceptance by Employer and issue of Inspection Certificate thereon shall in no way limit the liabilities and responsibilities of the Contractor in respect of the agreed quality assurance programme forming a part of the Contract, or if such equipment is found to be defective at a later stage.

8.8 Material Inspection clearance certificate (MICC) shall be issued by the Employer after inspection of the equipment. Employer may waive off the presence of Employer's inspecting engineer. In that case test will be carried out as per approved QP and test certificate will be furnished by the supplier for approval. MICC will be issued only after review and approval of the test reports.

8.9 The Employer will have the right of having at his own expenses any other test(s) of reasonable nature carried out at Contractor's premises or at site or in any other place in addition of aforesaid type and routine tests, to satisfy that the material comply with the specification.

8.10 The Employer reserves the right for getting any field tests conducted on the completely assembled equipment at site.

9.0 ENGINEER'S SUPERVISION

a) To eliminate delays and avoid disputes and litigation it is agreed between the parties to the Contract that all matters and questions shall be referred to the Engineer and without prejudice to the provision of Section GCC, the contractor shall proceed to comply with the Engineer's decision.

b) The work shall be performed under the direction and supervision of the Engineer. The scope of the duties of the Engineer, pursuant to the contract, will include but not be limited to the following :

i) Interpretation of all the terms and conditions of these documents and specifications ;

ii) Review and interpretation of all the Contractor's drawings, engineering data etc. ;

iii) Witness or authorise his representative to witness tests and trial either at the manufacturer's works or at site, or at any place where work is performed under the Contract ;

iv) Inspect, accept or reject any equipment, material and work under the Contract ;

v) Issue certificate of acceptance and/or progressive payment and final payment certificates ;

vi) Review and suggest modifications and improvements in completion schedules from time to time ; and

vii) Supervise the quality Assurance programme implementation at all stages of the Works.

10.0 TESTS

10.1 Charging

a) On completion of erection of the equipment and before charging, each item of the equipment shall be thoroughly cleaned and then inspected jointly by the Engineer and the Contractor for correctness and completeness of installation and acceptability for charging, leading to initial pre-commissioning tests at Site. The list of pre-commissioning tests to be performed are given in Chapte-TST and shall be included in the Contractor's quality assurance programme.

The pre-commissioning checks for various Switchyard Equipment shall be in line with the Pre-Commissioning checklist, Document code no. OS/T&C/BAY/95 (Rev. 0). Further, as regards to pre-commissioning checks for Series Capacitors and the overall system including Series

(15)

Capacitor and other equipment, protection etc., shall be mutually discussed and agreed upon.

b) The Contractor's commissioning engineers, specially identified as far as possible, shall be responsible for carrying out all the pre-commissioning tests. On completion of inspection and checking and after the pre-commissioning tests are satisfactorily over, the complete equipment shall be placed on Initial Operation during which period the complete equipment shall be operated integral with sub- systems and supporting equipment as a complete substation.

10.2 **Commissioning Tests**

a) The available instrumentation and control equipment will be used during such tests and the Engineer will calibrate, all such measuring equipment and devices as far as practicable. However, unmeasurable parameters shall be taken into account in a reasonable manner by the Engineer, for the requirement of these tests.

b) Any special equipment, tools and tackles required for the successful completion of the Commissioning Tests shall be provided by the Contractor, free of cost.

c) The specific tests to be conducted on equipment have been brought out in the Chapter-TST.

10.3 **Test Codes**

The provisions outlines in the IS & IEC codes or other international and Indian approved equivalents shall generally be used as a guide for all the above test procedures unless otherwise specified in the Technical Specifications.

11.0 HANDLING, STORING AND INSTALLATION

a) In accordance with the specific installation instructions as shown on manufacturer's drawings or as directed by the Employer or his representative, the Contractor shall unload, store, erect, install, wire, test and place into commercial use all the electrical equipment included in the contract. Equipment shall be installed in a neat, workmanlike manner so that it is level, plumb, square and properly aligned and oriented. Commercial use of switchyard equipment means completion of all site tests specified and energisation at rated voltage.

b) Contractor may engage manufacturer's Engineers to supervise the unloading, transportation to site, storing, testing and commissioning of the various equipment being procured by them separately. Contractor shall unload, transport, store, erect, test and commission the equipment as per

instructions of the manufacturer's supervisory Engineer(s) and shall extend full cooperation to them.

c) In case of any doubt/misunderstanding as to the correct interpretation of manufacturer's drawings or instructions, necessary clarifications shall be obtained from the Employer. Contractor shall be held responsible for any damage to the equipment consequent to not following manufacturer's drawings/instructions correctly.

d) 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. Any equipment damaged due to negligence or carelessness or otherwise shall be replaced by the Contractor at his own expense.

e) The Contractor shall be fully responsible for the equipment/material until the same is handed over to the Employer in an operating condition after commissioning. Con tractor shall be responsible for the maintenance of the equipment/material while in storage as well as after erection until taken over by Employer, as well as protection of the same against theft, element of nature, corrosion, damages etc.

f) Where material/equipment is unloaded by Employer before the Contractor arrives at site or even when he is at site, Employer by right can hand over the same to Contractor and there upon it will be the responsibility of Contractor to store the material in an orderly and proper manner.

g) Contractor shall be responsible for the proper storage and maintenance of all materials/equipment entrusted to him. He shall take all required steps to carry out frequent inspection of material/equipment stored as well as erected until the same is taken over by the Employer.

h) The words 'erection' and 'installation' used in the specification are synonymous.

i) Exposed live parts shall be placed high enough above ground to meet the requirements of electrical and other statutory safety codes.

j) Clearances and spacings shall be provided as per relevant IS.

Bidder shall confirm in their technical offer that all clearances and spacing as stated above will invariably be provided. Even though phase to earth clearance under normal conditions will be as above at certain points

where there can be bird faults (i.e. a bird sitting on the earthed metal part coming in contact with the HT terminal) adequate clearance as required shall be provided between the HT terminal and nearest grounded metal part.

12.0 TAKING OVER

Upon successful completion of all the tests to be performed at Site on equipment furnished and erected by the Contractor, the Engineer shall issue to the contractor a taking over certificate as a proof of the final acceptance of the equipment. such certificate shall not unreasonably be withheld nor will the Engineer delay the issuance thereof on account of minor omissions or defects which do not affect the commercial operation and/or cause any serious risk to the equipment. Such certificate shall not relieve the Contractor of any of his obligations which otherwise survive, by the terms and conditions of the Contract after issuance of such certificate.

13.0 PROTECTION

All coated surfaces shall be protected against abrasion, impact, discoloration and any other damages. All exposed threaded portions shall be suitably protected with protecting device. All ends of equipment connections shall be properly sealed with suitable devices to protect them from damage. The parts which are likely to get rusted, due to exposure to weather should also be properly treated and protected in a suitable manner.

14.0 PRESERVATIVE SHOP COATING

14.1 All exposed metallic surfaces subject to corrosion shall be protected by shop application of suitable coatings. All surfaces which will not be easily accessible after the shop assembly, shall beforehand be treated and protected for the life of the equipment. All surfaces shall be thoroughly cleaned of all mill scale, oxide and other coatings and prepared in the shop. The surfaces that are to be finish painted after installation or require corrosion protection until installation, shall be shop painted with at least two coats of primer. Transformers and other electrical equipment, if included shall be shop finished with one or more coats of primer and two coats of high grade resistance enamel. The finished colours shall be selected and specified by the Employer at a later date.

14.2 Shop primer for all steel surfaces which will be exposed to operating temperature below 95 deg.C. shall be selected by the Contractor, after obtaining specific approval of the Employer regarding the quality of primer proposed to be applied. Special high temperature primer shall be used on surfaces exposed to temperatures higher than 95 deg.C. and such primers shall also be subject to the approval of the Employer.

14.3 All other steel surfaces which are not to be painted shall be coated with suitable dust preventive compound subject to the approval of the Employer.

15.0 PROTECTIVE GUARDS

Suitable guards shall be provided for protection of personnel on all exposed rotating and/or moving machine parts. All such guards with necessary spares and accessories shall be designed for easy installation and removal for maintenance purpose.

16.0 DESIGN CO-ORDINATION

The Contractor shall be responsible for the selection and design of appropriate equipment to provide the best coordinated performance of the entire system. The basic design requirements are detailed out in this Technical Specification. The design of various components, sub-assemblies and assemblies shall be so done so that it facilitates easy field assembly and maintenance. All the rotating components shall be so selected that the natural frequency of the complete unit is not critical at or close to the operating range of the unit.

17.0 DESIGN CO-ORDINATION MEETING

The Contractor will be called upon to attend design co-ordination meetings with the Employer, other Contractor's and the Consultants of the Employer during the period of Contract. The Contractor shall attend such meetings at his own cost at New Delhi or at mutually agreed venue as and when required and fully cooperate with such persons and agencies involved during those discussions.

18.0 BUS POST INSULATORS

The post insulators shall conform in general to latest IS:2544, IEC-168 and IEC-815.

CONSTRUCTIONAL FEATURES

18.1 Post type insulators shall consist of a porcelain part permanently secured in a metal base to be mounted on the supporting structures. They shall be capable of being mounted upright. They shall be designed to withstand any shocks to which they may be subjected to by the operation of the associated equipment. Only solid core insulators will be acceptable.

18.2 Porcelain used shall be homogeneous, free from lamination, cavities and other flaws or imperfections that might affect the mechanical or dielectric quality and shall be thoroughly vitrified, tough and impervious to moisture.

18.3 Glazing of the porcelain shall be of uniform brown in colour, free from blisters, burrs and other similar defects.

18.4 The insulator shall have alternate long and short sheds with aerodynamic profile. The shed profile shall also meet the requirements of IEC-815 for the specified pollution level.

18.5 When operating at normal rated voltage there shall be no electric discharge between conductor and insulators which would cause corrosion or injury to conductors or insulators by the formation of substance produced by chemical action.

18.6 The design of the insulators shall be such that stresses due to expansion and contraction in any part of the insulator shall not lead to deterioration.

18.7 All ferrous parts shall be hot dip galvanised in accordance with the latest edition of IS:2633 and IS :4579. The zinc used for galvanising shall be grade Zn 99.95 as per IS:209. The zinc coating shall be uniform, adherent, smooth, reasonably bright, continuous and free from imperfections such as flux, ash, rust stains, bulky white deposits and blisters. The metal parts shall not produce any noise generating corona under the operating conditions.

18.8 If corona extinction voltage is to be achieved with the help of corona ring or any other similar device, the same shall be deemed to be included in the scope of the Contractor.

18.9 **Tests**

The post insulators shall be subject to type, acceptance, sample and routine tests as per IS:2544 and IEC-168.

18.10 TECHNICAL REQUIREMENTS FOR BUS POST INSULATORS

a)	Type	:	Solid Core
b)	Voltage class (kV)	:	420
c)	Dry & wet one minute power frequency withstand voltage (kV rms)	:	680
d)	Dry lightning impulse withstand voltage (kVp)	:	±1425
e)	Wet switching surge withstand voltage (kVp)	:	±1050
f)	Max. radio interference voltage (in microvolts) at voltage of	:	1000

	305 KVrms between phase to ground	
g)	Corona extinction voltage (kV rms)	320 (Min.)
h)	Total minimum cantilever strength (kg)	800
i)	Minimum torsional moment	As per IEC-273
j)	Total height of insulator (mm)	3650
k)	Pollution level as per IEC-815	Heavy (III)
l)	Minimum total creepage distance for heavy pollution (mm)	10500

19.0 REQUIREMENT OF AUXILIARY ITEMS

19.1 BUSHINGS, HOLLOW COLUMN INSULATORS, SUPPORT INSULATORS

a) Bushings shall be manufactured and tested in accordance with IS : 2099 & IEC : 137 while hollow column insulators shall be manufactured and tested in accordance with IEC:233/IS: 5621/IEC:61264, as applicable. The support insulators shall be manufactured and tested as per IS:2544/IEC:168 and IS:2099/IEC:273. The insulators shall also conform to IEC:815 as applicable.

b) Support insulators, bushings and hollow column insulators shall be manufactured from high quality porcelain. Porcelain used shall be homogeneous, free from laminations, cavities and other flaws or imperfections that might affect the mechanical or dielectric quality and shall be thoroughly vitrified tough and impervious to moisture.

c) Glazing of the porcelain shall be uniform brown in colour, free from blisters, burrs and similar other defects.

d) Support insulators/bushings/hollow column insulators shall be designed to have ample insulation, mechanical strength and rigidity for the conditions under which they will be used.

e) When operating at normal rated voltage there shall be no electric discharge between the conductors and bushing which would cause corrosion or injury to conductors, insulators or supports by the formation of substances produced by chemical action. No radio interference shall be caused by the insulators/bushings when operating at the normal rated voltage.

f) Bushing porcelain shall be robust and capable of withstanding the internal pressures likely to occur in service. The design and location of clamps and the shape and the strength of the porcelain flange securing the bushing to the tank shall be such that there is no risk of fracture. All portions of the assembled porcelain enclosures and supports other than gaskets, which may in any way be exposed to the atmosphere shall be composed of completely non hygroscopic material such as metal or glazed porcelain.

g) All iron parts shall be hot dip galvanised and all joints shall be air tight. Surface of joints shall be trued up porcelain parts by grinding and metal parts by machining. Insulator/bushing design shall be such as to ensure a uniform compressive pressure on the joints.

h) **TESTS :**

In accordance with the requirements stipulated, bushings, hollow column insulators and support insulators shall conform to type tests and shall be subjected to routine tests in accordance with IS : 2099 & IS : 2544.

i) Parameters of bushings/Hollow column insulators/support insulators :

a)	Rated Voltage	:	420 kV*
b)	Impulse withstand voltage (Dry & Wet)	:	± 1425 kVp*
c)	Switching surge withstand voltage(Dry & Wet)	:	± 1050 kVp*
d)	Power frequency with-stand voltage	:	630 kVrms*
e)	Total creepage distance	:	25mm/kV*
f)	Pollution level	:	Class-III : Heavy (as per IEC-71)

g) Insulator shall also meet requirement of IEC - 815, as applicable, having alternate long & short sheds.

NOTE : * The equipment rating is only indicative. Appropriate rating equipment may be supplied if so required in view of the series capacitor requirement.

19.2 **CONTROL PANELS, RELAY PANELS, CABINETS, JUNCTION BOXES, TERMINAL BOXES, MARSHALING BOXES AND MARSHALING KIOSKS:**

a) All types of boxes, cabinet/panels shall generally conform to IS : 5039, IS : 8623, IEC : 439, as applicable and the clauses given below :

b) Control cabinet/panels, junction boxes, Marshaling box & terminal boxes shall be sheet steel/Al. enclosed and shall be dust, water and vermin proof. Sheet steel used shall be at least 2.0 mm thick cold rolled/2.5 mm hot rolled. 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. In case of Al. enclosed box the thickness of Al. shall be such that it provides adequate rigidity and long life as comparable with sheet steel of specified thickness.

c) The enclosures of all outdoor type control cabinets/panel, junction boxes, terminal box & marshaling boxes shall provide a degree of protection of not less than IP 55 as per IS : 13947 and the same for indoor type enclosures shall be IP 31 as per IS : 13947and one control cabinet/panel, junction box, terminal box & marshaling box of each type shall be tested for the same, if the type test reports submitted are not to the satisfaction of the owner.

d) Control cabinet/panels, junction boxes, marshaling box & terminal box shall be provided with padlocking arrangements.

e) All doors, removable covers and plates shall be gasketed all around with neoprene gaskets. The neoprene gasket shall be tested in the presence of Employer's representative.

f) All sheet steel work shall be degreased, pickled, phosphated and then applied with two coats of zinc chromate primer and two coats of finishing synthetic enamel paint. The colour of finishing paint shall be light admiralty grey in accordance with shade No. 697 of IS : 5 outside and inside shall be glossy white.

g) All terminal boxes, control cabinet/panels, junction boxes & marshaling boxes shall be designed for the entry of cable from bottom by means of weather proof and dust-proof connections. Boxes and cabinet/panels shall be so 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/panel. Suitable cable gland plate on the base of the box shall be provided for this purpose. Necessary number of cable glands of suitable sizes shall be supplied and fitted on this gland plate. This removable gasketted gland plate shall have provision for spare glands to be used in future. The glands shall project at least 25 mm above the gland plate to prevent the entry of moisture in the cable crutch. The roof of the outdoor cabinet/panels/boxes shall preferably be of sloping design to prevent stagnation of water.

h) Suitable heaters shall be provided in the cabinet/panel, junction boxes & marshaling boxes to prevent condensation. Heaters shall maintain cubicle temperature approximately 10°C above the outside air temperature. The heaters shall be suitable for 240 V AC supply voltage. On-off switch and fuse for this shall be provided.

i) **Terminal Block :**

All internal wiring to be connected to the external equipment shall terminate on terminal blocks, preferably vertically mounted on the side of cabinet/panel, junction box, terminal box and marshaling box.

The terminal blocks shall be made of moulded, non-inflammable thermosetting plastic. The material of terminal block moulding shall not deteriorate because of varied conditions of heat, cold, humidity, dryness, etc. that would be anticipated at the location where the equipment is proposed to be installed.

The terminal shall be such 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 terminal blocks shall be non- disconnecting stud type equivalent to Elmex type CAT - M4/CST.

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 of ***650*** V grade and shall be rated to carry continuously the maximum current that is expected to be carried by the terminals.

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

The terminals shall be provided with the marking tags for wiring identification.

All boxes shall be provided with 20 % spare terminals unless otherwise specified.

j) There shall be a minimum clearance of 250 mm between the first row of terminal block and the cable gland plate or side of the box. Also the clearance between two rows of terminal blocks or side of the box shall be a minimum of 150 mm.

k) 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/panel is live. Cabinet/panel wiring should be suitable for 60°C as the space heaters will keep the temperature 10°C higher than the ambient.

l) **Wiring :**

All wiring shall be carried out with ***650*** V grade, stranded copper wires. The minimum size of the stranded conductor used for internal wiring shall be as follows :
i)All circuits except CT circuits – 1.5/ 0.75.00.4 sq.mm (depending on the device current rating)

ii) CT circuits- 4sq mm; minimum no. of strands shall be 3 per conductor.

iii) Wrapping wires shall be used for electronic rack connection.

All internal wiring shall be securely supported, neatly arranged readily accessible and connected to equipment terminals and terminal blocks.

Wire terminations shall be made with solderless crimping type of tinned copper lugs which firmly grip the conductor and insulation. Insulated sleeves shall be provided at all the wire terminations. Engraved core identification plastic ferrules marked to correspond with the wiring diagram shall be fitted at both ends of each wire. Ferrules shall fit tightly on the wires and shall not fall off when the wire is disconnected from terminal blocks.

All wires directly connected to trip circuit breaker shall be distinguished by the addition of a red coloured unlettered ferrule. Number 6 & 9 shall not be included for ferrule purposes.

All terminals including spare terminals of auxiliary equipment shall be wired upto terminal blocks. Each equipment shall have its own central control cabinet in which all contacts including spare contacts from all poles shall be wired out.

A 240V, single phase, 50 Hz, 15 amp AC plug and socket shall be provided in the cabinet/panel with ON-OFF switch for connection of hand lamps. Plug and socket shall be of industrial grade.

For illumination of Control cabinet/panel a 20 Watts Fluorescent Tube/Incandescent Lamp shall be provided.

All control switches shall be of rotary switch type or push button type and toggle/piano switches shall not be accepted.

In accordance with the requirements stipulated under this Chapter control cabinet/panels, junction boxes, terminal boxes & marshaling boxes shall conform to type tests and shall be subjected to routine tests in accordance with IS : 5039. In addition to the type tests, verification of the degree of protection as per IS : 13947, shall be conducted, if the type test reports submitted by the Contractor are not to the satisfaction of the owner. After protection degree tests on control cabinet/panel, power frequency voltage of 2.0 kV rms for 1 minute shall be applied for checking insulation resistance and functional test shall also be conducted.

m) **Earthing :**

Positive earthing of the cabinet/panel shall be ensured by providing two separate earthing pads. The earth wire shall be terminated on to the earthing pad and secured by the use of star or self etching washers. Earthing of hinged door shall be done by using a separate earth wire.

19.3 **MOTORS :**

Motors shall be "Squirrel Cage" three phase induction motors of sufficient size capable of satisfactory operation for the application and duty as required for the driven equipment and shall conform to type tests and shall be subjected to routine tests as per applicable standards. The motors shall be of approved make.

19.4 **TERMINAL CONNECTORS AND CLAMP CONNECTORS :**

The Terminal Connectors of all types shall meet the following requirements:

a) Terminal connectors shall be manufactured and tested as per IS: 5561.

b) All castings shall be free from blow holes, surface blisters, cracks and cavities. All sharp edges and corners shall be blurred and rounded off.

c) No part of a clamp shall be less than 10 mm thick.

d) All ferrous parts shall be hot dip galvanised conforming to IS: 2633.

e) For bimetallic connectors, copper alloy liner of minimum thickness of 2 mm shall be provided.

f) Flexible connectors shall be made from tinned copper/ aluminium sheets or cables.

g) All current carrying parts shall be designed and manufactured to have minimum contact resistance.

h) Connectors shall be designed to be corona free in accordance with the requirements stipulated in IS: 5561.

i) All test/checks on terminal connectors shall be as per IS: 5561.

19.5 **AUXILIARY SWITCH :**

The type test reports or the following tests on auxiliary switch shall be furnished :

a) Electrical endurance test - A minimum of 2000 operations for 2A DC with a time constant greater than or equal to 20 milliseconds with a subsequent examination of mV drop/visual defects/temperature rise test.

b) Mechanical endurance test - A minimum of 1,00,000 operations with a subsequent checking of contact pressure test/visual examination.

c) Heat run test on contacts.

d) IR/HV test etc.

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SECTION IV

GUARANTEED AND TECHNICAL PARTICULARS OF ACSR MOOSE

1.	Manufacturer's Name & address	
2.	Particulars of raw material	
2.1	Aluminium	
a)	Min. purity of aluminium	%
b)	Max. Copper content	%
2.2	Steel wires/ Rods	
a)	Carbon	%
b)	Manganese	%
c)	Phosphorus	%
d)	Sulphur	%
e)	Silicon	%
2.3	Zinc- Minimum Purity	%
3.	Aluminium Strands after stranding	
3.1	Diameter	
	a) Nominal	mm
	b) Maximum	mm
	c) Minimum	mm
3.2	Min. breaking load of strand after stranding	kN
3.3	Max. resistance of 1m length of strand at 20° C	
4.	STEEL STRANDS AFTER STRANDING	
4.1	Diameter	
	a)Nominal	mm
	b)Maximum	mm
	c)Minimum	mm
4.2	Min. breaking load of strand	Kn
4.3	Galvanizing	
a)	Min. weight of zinc coating per sq.m of uncoated wire surface	gm.
b)	Min. no. of dips that the galvanized strand can withstand in the standard preece test	
c)	Min. number of twist to be withstood in torsion test when tested on a gauge length of100 times diameter of wire	Nos.

5.	ACSR CONDUCTOR	
5.1	Minimum UTS	kN
5.2	Lay Ratio of conductor	
a)	Outer Steel layer	
b)	Aluminium - 12 wire layer	
c)	Aluminium 18 wire layer	
d)	Aluminium 24 wire layer	
5.3	DC resistance of ACSR at 20°C	Ω
5.4	Min. corona extinction voltage (dry)	kV
5.5	RIV at 1 MHz across 300-ohm resistor at 305 kV under dry conditions	
5.6	Standard length of conductor in one drum	m
5.7	Direction of lay for outside layer	-
5.8	Linear mass of conductor	mm
a)	Standard	kg/km
b)	Minimum	kg/km
c)	Maximum	kg/km
6.	No. of cold pressure but welding equipment available at works	

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SECTION V

QUALITY PLAN

Bidder shall follow standard BHEL QAP doc. No. TBQM-STD-CON.