Enquiry

Bharat Heavy Electricals Limited
Transmission Business Group
Materials Management

Project : PGCIL FATEHABAD(AGRA NEW)

Enquiry No	Enquiry Dt	Rev No	Rev Dt	PI No	Enquiry Type	Inspection by	Due Dt	Commercial Comments	Technical Comments	Signing Authority
124E265	26-Mar-15	0		342240283	Package		24-Apr-15		As per Technical Specification No. TB-376-316-114 Rev 00.	

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	Unit Exworks	% ED	% CST	% VAT	Unit F&I	Plan Dt	Comments
1	POST INSULATORS	LOT	1						01-Oct-15	
2	765kV , 10kN Post insulator without corona ring	Nos.	204							
3	765kV , 8kN Post insulator with corona ring	Nos.	54							
4	765kV , 8kN Post insulator without corona ring	Nos.	12							
5	400kV , 8kN Post insulator with corona ring	Nos.	67							
6	400kV , 8kN Post insulator without corona ring	Nos.	42							
7	400kV, 10kN Post insulator without corona ring	Nos.	378							
8	72.5kV,6kN Post Insulator	Nos.	23							
9	33kV,4kN Post Insulator	Nos.	9							
10	Mandatory spare 765kV , 10kN Post insulator without corona ring	Nos.	2							
11	Mandatory spare 765kV , 8kN Post insulator with corona ring	Nos.	1							
12	Mandatory spare 400kV , 10kN Post insulator without corona ring	Nos.	3							
13	Mandatory spare 400kV , 8kN Post insulator with corona ring	Nos.	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.

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
R.K.Gangal
Sr.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: 0120-6748477
Fax: 0120-6748581

Signature and Seal of Tenderer

Enquiry No : 124E265 **Enquiry Dt :** 26-Mar-15

ENQUIRY NO. 124E265

Date: 26.03.15

BHEL/TBG/ATS/01

ACTIVITY SCHEDULE

(To be filled – up by the supplier)

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

SL. NO.	ACTIVITY		ACTIVITY TIME IN WEEKS	CUMULATIVE TIME IN WEEKS FROM LOI/PO DATE	REMARKS IF ANY
1.	Receipt of P.O				
2.	Submission of P.O Acceptance	Max 1 week (7 days)			
3.	Submission of documents necessary for getting manufacturing clearance like Drawings, date sheet etc.				
4.	Review and Approval of documents and issue of manufacturing clearance	**'3 WEEKS BY BHEL"**			
5.	Manufacturing Time				
6.	Inspection and Issue of MICC	**'2 WEEKS BY BHEL"**			
7.	Issue of other documents like Road Permits etc.	**'1 WEEK BY BHEL"**			
8.	Dispatch				
9.	Transit time upto Site.				

Note : 1) For item at Sl. No. 4) Vendor to reply to all queries within 3 days.

2) For Sl. No. 5) Inspection call for entire lot to be issued 2 weeks in advance. Date given in call for inspection should be within the period indicated in "A" for completion of activity at Sl. No. 6.

3) 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 & Seal of

Supplier

Date:

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: 02:00 PM on the same day.

Clause 2: PRICES

A.1.: **Applicable**

A.2.: Not applicable

B.1.: Applicable

B.2. NOT APPLICABLE

B.3. Not applicable

C**.** Price Break up should consist of the following:

a- FOB port of Loading.

b- Marine Freight and Insurance from load port to discharge port i.e. Any Indian port- preferably Mumbai sea 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. BHEL reserves the right to place order either on FOB (load port) basis or CIF (Any Indian port- preferably Mumbai sea port) basis.

Freight and 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 (i.e. from discharge port to respective sites)

Clause 3: TERMS OF PAYMENT

Terms for BOP is not applicable

Terms for BOI is applicable

Bill of Lading/ AWB instead of receipted LR

Dispatch clearance by BHEL means BHEL MICC

Clause 6: PERFORMANCE BANK GUARANTEE

Option A – NOT APPLICABLE

Option B
BG for 10% of the total Ex-works PO value, valid for 18 months from the date of last delivery against PO. The claim period of 3 months shall also be required from the date of expiry of PBG, ie. over and above the guarantee period of 18 months. Total validity of PBG shall be for 21 months from the date of last delivery, i.e. inclusive of claim period. PO value at the time of first invoice for the particular order shall be considered for calculation of BG amount.

Option C
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.

Clause 11: DELAYED DELIVERY:

In case of delay in execution of order beyond the lot wise contractual delivery. LD shall be levied as follows:

LD shall be 0.5% of the total order value per week of delay or part thereof subject to a maximum of 10% of the total order value.

14: EVALUATION:

Comparative statement shall be prepared and evaluation shall be done accordingly on following basis:

Group I: 765 KV BPI (8 KN & 10 KN) **Group II:** 400 KV BPI (8 KN & 10 KN)

Group III: 72.5 KV 7 33 KV BPI

Evaluation shall be done on the basis of delivered cost to BHEL (group wise) and PO shall be placed on group wise L1 vendor.

Note: Group wise evaluation shall be done because some vendor/vendors may be qualified for up to 400 or 72.5/ 33 KV voltage rating only. However, in case any vendor becomes L1 for more than one group, then combined PO for those groups (in which vendor is L1) shall be placed on such vendor.

Clause 16: ARBITRATION

The Arbitration shall be under "The Arbitration and Conciliation Act 1996".

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

Note:

1. Proposed delivery plan is **01-Oct-2015.** However, vendor has to quote their best possible delivery plan in activity schedule.

2. 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.

   Pls refer Annexure-1 for Terms & Conditions of Reverse Auction.

3. **PRE QUALIFYING REQUIREMENT as follows:**

   3.1 Technical Requirement- As per Technical Specification No. TB-376-316-114 Rev 00.

   3.2 Commercial Requirement:

   3.2.1. The vendor/ Manufacturer should have valid MQP No. approved by Powergrid.

   3.2.2. New vendor, which is not registered with Powergrid has to get themselves approved from Powdergrid directly and submit copy of approval with Powergrid within 28 days from the date of techno-commercial bid opening.

4 Offer of (non customer approved vendors) acceptable subject to approval by customer.

OFFER EVALUATION

a) In case of offers from Indian vendors only - Evaluation shall be done on landed cost to BHEL.

b) In case of offers from foreign vendors only - Evaluation shall be done on CIF (discharge port) basis and PO shall be placed on FOB basis with an option to convert the PO on CIF basis.

c) In case of offers from Indian and foreign vendors both - Evaluation shall be done on landed cost to BHEL.

1- 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.

2- For evaluation, exchange rate (TT selling rate of SBI) as on scheduled date of tender opening (part-I in case of two part bid) shall be considered.

3- Following details regarding shipment shall also be mentioned to arrange logistics for the same-

a) No. of package.
b) Size and Weight (Net & Gross) of each package.
c) No. of containers required with type of container & size of container.
d) Type of cargo (Break Bulk/LCL/FCL).
e) Custom Tariff No.

LOADING CRITERIA:

Permissible commercial deviation & Loading Criteria:

TERMS OF PAYMENT:

If a bidder asks for payment within specified no. of days from the date of receipt of invoice with complete documents as per "Terms of Payment" at Clause. No. 3 of Terms & Conditions for Indigenous Tender Enquiry, loading to be done as follows:

a) Base rate of SBI (as applicable on the date of techno commercial bid opening) + 6 % shall be considered for loading for the period of relaxation sought by the bidder. **Loading shall be done on total cost to BHEL.**

b) 60 days - No loading

DELAYED DELIVERY:

Any loading on LD clause shall be to the extent to which it is not agreed by bidder (at offered value).

Permissible Technical Deviations: No permissible Technical Deviation has been envisaged.

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: 02:00 PM on the same day.

Clause 2: PRICES

A.1.: Applicable.

A.2.: Not Applicable

B.1.: Applicable

B.2. Not Applicable

B.3. Not applicable

Clause 3: TERMS OF PAYMENT

Terms for BOP is not applicable

Terms for BOI is applicable

Original Endorsed LR along with Original Material Receipt Certificate is required instead of receipted LR

Dispatch clearance by BHEL means BHEL MICC

Clause 6: PERFORMANCE BANK GUARANTEE

Option A - Same as per GTC

Note :- IF TOTAL Ex-works EXCEEDS Rs. 2,00,00,000/- ,THEN OPTION – A SHALL NOT BE APPLICABLE. Vendor to opt from option B or C only.

Option B

BG for 10% of the total Ex-works PO value, valid for 18 months from the date of last delivery against PO. The claim period of 3 months shall also be required from the date of expiry of PBG, ie. over and above the guarantee period of 18 months. Total validity of PBG shall be for 21 months from the date of last delivery, i.e. inclusive of claim period. PO value at the time of first invoice for the particular order shall be considered for calculation of BG amount.

Option C

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.

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Note: Group wise evaluation shall be done because some vendor/vendors may be qualified for up to 400 or 72.5/ 33 KV voltage rating only. However, in case any vendor becomes L1 for more than one group, then combined PO for those groups (in which vendor is L1) shall be placed on such vendor.

Clause 16: ARBITRATION

The Arbitration shall be under "The Arbitration and Conciliation Act 1996".

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

Note:

1. Proposed delivery plan is **01-Oct-2015.** However, vendor has to quote their best possible delivery plan in activity schedule.

2. In case VAT is applicable, then Vendor has to give VAT invoice (irrespective of VAT benefit available or not)

3. VAT charged, if any shall be included in arriving at total cost to BHEL.

4. 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.

   Pls refer Annexure-1 for Terms & Conditions of Reverse Auction.

5. **PRE QUALIFYING REQUIREMENT as follows:**

   5.1 **Technical Requirement**- As per Technical Specification No. TB-376-316-114 Rev 00.

   5.2 Commercial Requirement:

   5.2.1. The vendor/ Manufacturer should have valid MQP No. approved by Powergrid.
   5.2.2. New vendor, which is not registered with Powergrid has to get themselves approved from Powdergrid directly and submit copy of approval with Powergrid within 28 days from the date of techno-commercial bid opening.

6. Offer of (non customer approved vendors) acceptable subject to approval by customer.

   OFFER EVALUATION

   a) In case of offers from Indian vendors only - Evaluation shall be done on landed cost to BHEL.
   b) In case of offers from foreign vendors only - Evaluation shall be done on CIF (discharge port) basis and PO shall be placed on FOB basis with an option to convert the PO on CIF basis.
   c) In case of offers from Indian and foreign vendors both - Evaluation shall be done on landed cost to BHEL.

LOADING CRITERIA:

Permissible commercial deviation & Loading Criteria:

TERMS OF PAYMENT:

If a bidder asks for payment within specified no. of days from the date of receipt of invoice with complete documents as per "Terms of Payment" at Clause. No. 3 of Terms & Conditions for Indigenous Tender Enquiry, loading to be done as follows:

a) Base rate of SBI (as applicable on the date of techno commercial bid opening) + 6 % shall be considered for loading for the period of relaxation sought by the bidder. **Loading shall be done on total cost to BHEL.**

b) 60 days - No loading

DELAYED DELIVERY:

Any loading on LD clause shall be to the extent to which it is not agreed by bidder (at offered value).

Permissible Technical Deviations: No permissible Technical Deviation has been envisaged.

INTENDED BENEFITS FOR MSE SUPPLIERS:

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 as per Annexure I) applicable for the year, certifying quantum of investment in plant & machinery within the permissible limit as per the act for relevant status (Micro or Small) where 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.

SCHEDULE OF PRICE (Part II)-APPLICABLE FOR INDIAN VENDORS ONLY

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

Enq. No. 124E265 dtd. 26.03.15 (APPLICABLE FOR INDIAN VENDORS ONLY)

S.No.	Description of Item	Unit	Qty.	Unit Price Ex-works	Total Ex-Works	Unit F & I	(**)ED @____ % of Col6	CST / VAT @____% of (Col 6+9)	Service Tax @_____% of Col____	TOTAL (FOR Destination) PRICE (Rs.)
1	2	3	4	5	6	7	9	10	11	12
1	765 KV, 10 KN Post Insulator without Corona Ring	No.	204							
2	765 KV, 8 KN Post Insulator with Corona Ring	No.	54							
3	765 KV, 8 KN Post Insulator without Corona Ring	No.	12							
4	400 KV, 8 KN Post Insulator with Corona Ring		67							
5	400 KV, 8 KN Post Insulator without Corona Ring	No.	42							
6	400 KV, 10 KN Post Insulator without Corona Ring	No.	378							
7	72.5 kV, 6 KN Post Insulator	No.	23							
8	33 KV, 4 KN Post Insulator	No.	9							
9	Mandatory spare 765 KV, 10 KN Post Insulator without Corona Ring	No.	2							
10	Mandatory Spare 765 KV, 8 KN Post Insulator with Corona Ring	No.	1							
11	Mandaory Spare 400 KV, 10 KN Post Insulator without Corona Ring	No.	3							
12	Mandatory Spare 400 KV, 8 KN Post Insulator with Corona Ring	No.	1							
	TOTAL PRICE									

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.(For detail please refer to Annexure to GTC)

6. IMPORT CONTENT - YES/NO

(to be confirmed)

7. Vendor to specifically mention the rate of applicabe tax and specifically mention the column no. on which that tax is applicable

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.**

Enq. No. 124E265 dtd. 26.03.2015

A	B	C	D	E	F	G	H	I	J	K	L	M
	Name of item	**Unit**	**Qty**	**Tariff No.**	**Unit-CIF {Any Indian port- preferably Mumbai sea port}**	**Total -CIF {Any Indian port- preferably Mumbai sea port}.**	**Break up of CIF(Any Indian port- preferably Mumbai sea port) rates**					
							Unit -FOB (Load port).	**Total - FOB (Load port).**	**Unit-Sea Freight (upto Any Indian port- preferably Mumbai sea port**	**Total-Sea Freight (upto Any Indian port- preferably Mumbai sea port)**	**Unit-Insurance(upto Any Indian port- preferably Mumbai sea port)**	**Total-Insurance(upto Any Indian port- preferably Mumbai sea port)**
1	765 KV, 10 KN Post Insulator without Corona Ring	No.	204									
2	765 KV, 8 KN Post Insulator with Corona Ring	No.	54									
3	765 KV, 8 KN Post Insulator without Corona Ring	No.	12									
4	400 KV, 8 KN Post Insulator with Corona Ring		67									
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8	33 KV, 4 KN Post Insulator	No.	9									
9	Mandatory spare 765 KV, 10 KN Post Insulator without Corona Ring	No.	2									
10	Mandatory Spare 765 KV, 8 KN Post Insulator with Corona Ring	No.	1									
11	Mandaory Spare 400 KV, 10 KN Post Insulator without Corona Ring	No.	3									
12	Mandatory Spare 400 KV, 8 KN Post Insulator with Corona Ring	No.	1									
	Total											

	NOTE-
a	**Discharge Port:- Any Indian port- preferably Mumbai Sea Port**
b	**CIF (Any Indian sea port- preferably Mumbai sea port) should be equal to "FOB(load port) + Sea Freight (upto Any Indian sea port- preferably Mumbai) +Insurance(upto Any Indian sea port- preferably Mumbai)"**
c	**Load port to be mentioned by bidder .**
d	**No. of packages 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.**
e	**Vendor has to mention tarrif no against each item for custom duty purpose.**
f	**Bidder has to mention quoted (in each cell) in unpriced price bid**

ENQUIRY NO. 124E265

Dated: 26.03.15 BHEL/TBG/SO1/01

CHECKLIST

SCHEDULE OF INFORMATION TO BE FURNISHED WITH THE OFFER

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

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

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

The above checklist is verified for:-

Offer Ref. :

Equipment :

Submitted by : M/s

Project Reference. :

Signed with Seal ……..

Date ……..

Annexure - I

Certificate by Chartered Accountant on letter head

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

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

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

(Strike off whichever is not applicable)

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

Or

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

Date:

(Signature)

Name -

Membership number -

Seal of Chartered Accountant

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(s) (whose quote is highest in online sealed bid) may not be allowed to participate in further RA process.

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
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 **Material Management Division,** **Transmission Business Group,** **BHEL, Tower A, 5th Floor,** **Advant Navis IT Business Park,** **Plot No. 7, Sector-142, Expressway, Noida** **Distt. Gautam Buddha Nagar, U.P-201305** 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 Ravi Joshi (Manager-TBEM) BHEL, Tower A, 5th Floor, Advant Navis IT Business Park, Plot No. 7, Sector-142, Expressway, Noida, Distt. Gautam Buddha Nagar, U.P-201305 e-mail : rjoshi@bhel.in Phone: 0120-6748533

Sr. No	Terms & Conditions
	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. *<Formula>* The base indices in the formula shall be of first notification of ---------- of the --------- month. 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

Sr. No	Terms & Conditions
	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>** <u>For BOIs (non package items)</u> 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. <u>For BOPs : Air-Conditioning & Ventilation, Fire Protection, Illumination, Oil handling system where ETC is in scope of bidder</u>

Sr. No	Terms & Conditions
	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. 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.

Sr. No	Terms & Conditions
	Option B BG for 10% of the total Ex-works PO value, valid for 24 months from the date of first delivery. PO value at the time of first invoice for the particular order shall be considered for calculation of BG amount. Option C Retention of 10% of the total Ex-works PO value by BHEL from the first bill in lieu of Performance Bank Guarantee, to be released after expiry of 24 months from the date of first delivery. Note : 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:** 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 :**

Sr. No	Terms & Conditions
	BHEL reserves the right to reject in full or part, any or all tender without assigning any reason thereof. BHEL also reserves right to vary the quantities mentioned in the tender.
14.	**EVALUATION :** Comparative statement shall be prepared based on overall quantity basis unless otherwise indicated in the enquiry. Evaluation of offers shall be done on the basis of delivered cost to BHEL.
15.	**DEVIATION :** The bids having deviation(s) w.r.to tender are liable for rejection. However, BHEL, at its discretion, may load the prices for evaluation of offer 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 :** 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.	**MQP:** **Vendor to submit approved MQP in-line with requirement of customer.**

Signature of Bidder
Seal

SCHEDULE OF TECHNICAL DEVIATION

TENDER ENQUIRY NO. 124E265 **DTD. 26.03.15**

The following are the devitions/ variations exception from the Technical Specifications:

SL.NO.	CLAUSE NO. OF GENERAL TERMS AND CONDITIONS	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 Technical Specifications,

If there is NIL deviation,even then the format to be filled as NIL DEVIATION.

Note : Continuation Sheets of like size and format may be used as per the Bidder's Requirement and shall be annexed to this schedule.

All deviations must be mentioned in this format only. Deviation(s) to terms mentioned else where will not be considered.

Signature of the authorised representative of

Place: ……

Date : ……

Bidder's name :……..

Designation:……..

Company Seal:…….

SCHEDULE OF COMMERCIAL DEVIATION

TENDER ENQUIRY NO. 124E265 dtd. 26.03.15

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

SL.NO.	CLAUSE NO. OF GENERAL TERMS AND CONDITIONS	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 Gerneal Terms and Conditions.

If there is NIL deviation,even then the format to be filled as NIL DEVIATION.

Note : Continuation Sheets of like size and format may be used as per the Bidder's Requirement and shall be annexed to this schedule.

All deviations must be mentioned in this format only. Deviation(s) to terms mentioned else where will not be considered.

Signature of the authorised representative of

Place: ……

Date : ……

Bidder's name :……

Designation:……..

Company Seal:……

BHARAT HEAVY ELECTRICALS LIMITED

TRANSMISSION BUSINESS ENGINEERING MANAGEMENT

NEW DELHI

DOCUMENT No.	TB-376-316-114	Rev	00		Prepared	Checked	Approved
CUSTOMER Doc. No.				NAME	RJ	VK	RS
TYPE OF DOC.	TECHNICAL SPECIFICATION			SIGN			
TITLE	765/400/66kV/33 kV POST INSULATORS			DATE	12/01/15	20/1/15	
				GROUP	TBEM		
				W.O. No			

CUSTOMER	**POWER GRID CORPORATION OF INDIA LIMITED**
PROJECT	765kV/400kV Agra UPPTCL (New) Substation
NOA Ref:	

List of Contents — No. of Pages

Enclosures:

00					First Issue
Rev.	Date	Altered	Checked	Approved	REVISION DETAILS

Distribution	CUSTOMER	TBMM	O/C	
	-	1	1	

SECTION - 1

1.1 SCOPE

This technical specification covers the requirements of design, manufacture, testing at works, packing and dispatch of 765kV,400 kV,66kV & 33 kV Insulators to site.

This section covers the scope and quantities of 765kV,400 kV,66kV & 33 kV Insulators. The Specific Technical Requirements for the above item as specified by the customer (PGCIL) are given in Section-2. The offered equipment shall also comply with the General Technical Requirements for the project as detailed under section-3 of this specification.

In case of any discrepancies between the requirements mentioned under Section-1/Section-2 and those specified in the Section-3, the specifications given under Section-1/Section-2 shall prevail and shall be treated as binding requirements.

The equipment is required for the following project:

Customer : Power Grid Corporation of India Ltd.
Project :765kV/400kV Agra UPPTCL (NEW) Substation
Owner : UP Power Transmission Corporation Ltd.

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

1.2 SPECIFIC TECHNICAL REQUIREMENTS

All equipments shall perform satisfactorily under various other electrical, electromechanical and meteorological conditions of the site of installation.
All equipment shall be able to withstand all external and internal mechanical, thermal and electromechanical forces due to various factors like wind load, temperature variation, ice & snow, (wherever applicable) short circuit etc for the equipment.

Aluminum used for corona ring shall be of grade 63401 or 19501 conforming to IS-5082.

The equipment shall also comply to the following:

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

Equipments and system shall be designed to meet the following major technical parameters as brought out hereunder.

SN	Parameters	765kV	400kV	66kV	33kV
1	Max. System Voltage (kV)	800kV	420	72.5kV	36
2	Impulse withstand voltage (dry & wet) (kVp)	± 2100	± 1425	325	± 170
3	Switching surge withstand voltage (dry and wet) (kVp)	± 1550	± 1050	-	-

4	One Minute Power frequency withstand voltage (dry & wet) (kVrms)	830	680	140	70
5	Total creepage distance (min) (mm)	20000	10500	1812.5	900
6	Max. Radio Interference voltage Min.(kV)	1000 at 508kV	500 at 305kV	-	-
7	Corona Extinction Voltage (kV rms) Min.	508	320		
8	Total height of Insulator (mm)	5700	3650		
9.	Pollution Level as per IEC-815	Heavy-III	Heavy	III	Heavy

PCD details for765kV kV,10kN Insulator: (For Isolator)

Top PCD	=	225mm
No. of holes	=	4 x M18 mm dia
Bottom PCD	=	**356 mm**
No. of holes	=	8 x 18 mm dia

ddddd

PCD details for 765kV,8kN Insulator:

Top PCD	=	225 mm
No. of holes	=	4 x M16
Bottom PCD	=	**325 mm**
No. of holes	=	8 x 18 dia

PCD details for 400 kV,10kN Insulator: (For Isolator)

Top PCD	=	127 mm
No. of holes	=	4 x M16
Bottom PCD	=	**325 mm**
No. of holes	=	8 x 18 dia

PCD details for 400 kV,8kN Insulator:

Top PCD	=	127 mm
No. of holes	=	4 x M16
Bottom PCD	=	**300 mm**
No. of holes	=	8 x 18 dia

Insulators shall also meet requirement of IEC-60815 for 420 kV systems, as applicable having alternate long & short sheds. Insulator shall be type and routine tested as per IEC-60168.

1.3 BILL OF QUANTITIES

Required quantities of various voltage classes of Post Insulators for the project shall be as given below, however quantities may vary up to ± 20% (cumulative) during contract stage.

1.3.1 Main Items

Sl. No	Description	Unit	Total Qty
1.	765kV, 10kN Solid Core Post Insulators complete in all respects (without corona ring)	Nos	204
2.	765kV, 8kN Solid Core Post Insulators complete in all respects (with corona ring)	Nos	54
3.	765kV, 8kN Solid Core Post Insulators complete in all respects (without corona ring)	Nos	12
4.	420 kV,8kN Solid Core Post Insulators complete in all respects (with corona ring)	Nos	67
5.	420 kV,8kN Solid Core Post Insulators as complete in all respects (without corona ring)	Nos	42
6.	420 kV,10kN Solid Core Post Insulators for 400kV Isolators complete in all respects (without corona ring)	Nos	378
7.	66kV,4kN Solid Core Post Insulators complete in all respects	Nos	23
8.	36kV,4kN Solid Core Post Insulators complete in all respects	Nos	9
9.	Mandatory Spares (listed in clause 1.3.2)	Lot	1

NOTE:

1) Post insulator shall be supplied complete with Hot Dip Galvanised hardware for inter unit joining and fixing to structure (both top & bottom).

1.3.2 Mandatory Spares

Sl. No	Description	Unit	Project Quantity
1.	765kV,10kN Solid Core Post Insulators for 765kV Isolators complete in all respects (without corona ring)	Nos.	2

2.	765kV,8kN Solid Core Post Insulators complete in all respects (without corona ring)	Nos.	1
3.	420 kV,8kN Solid Core Post Insulators complete in all respects (with corona ring)	Nos	1
4.	420 kV,10kN Solid Core Post Insulators for 400kV Isolators complete in all respects (without corona ring)	Nos	3

1.4 TYPE TESTING

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. 28.04.14. 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.

1.5 QUALITY PLAN

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

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SECTION – 2

STANDARD SPECIFICATION

2.0 GENERAL

This section covers the standard technical specification for Bus Post Insulator.

2.1 GENERAL TECHNICAL REQUIREMENTS

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

2.2 CONSTRUCTIONAL FEATURES:

2.3.1 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.

2.3.2 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 verified, tough and impervious to moisture.

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

2.3.4 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.

2.3.5 When operating at 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.

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

2.3.7 All ferrous parts shall be hot dip galvanized in accordance with the latest edition of IS: 2633, & IS: 4579. The zinc used for galvanizing 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.

2.3.8 a) Every bolt shall be provided with a steel washer under the nut so that part of the threaded portion of the bolts is within the thickness of the parts bolted together.

b) Flat washer shall be circular of a diameter 3.5 times that of bolt and of suitable thickness. Where bolts heads/nuts bear upon the beveled surfaces they shall be provided with square tapered washers of suitable thickness to afford a seating square with the axis of the bolt.

c) All bolts and nuts shall be of steel with well formed hexagonal heads forged from the solid and shall be hot dip galvanized. The nuts shall be good fir on the bolts and two clear threads shall show through the nut when it has been finally tightened up.

2.3.9 Aluminum used for corona ring shall be of grade 63401 or 19501 conforming to IS-5082.

Bidder shall make available data on all the essential features of design including the method of assembly of shells and metals parts, number of shells per insulator, the manner in which mechanical stresses are transmitter through shells to adjacent parts, provision for meeting expansion stresses, results of corona and thermal shock tests, recommended working strength and any special design or arrangement employed to increase life under service conditions.

2.3 Tests

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

2.3.1 Type test reports shall be furnished for the following type tests for approval and waiver.

a) Power frequency withstand test (dry & wet)
b) Lighting impulse test (dry)
c) Switching Impulse test (wet) (for 420 kV insulator only)
d) Test for deflection under load
e) Test for mechanical strength
f) Measurement of RIV (dry) and Corona extinction voltage test (dry). The test procedure for same is given in Appendix-1

If bidder already has Powergrid approved valid standard type test approval same may also be got extended for this Project also.

2.3.2 In addition to **acceptance/sample/routine tests** as per IS: 2544 and IEC-168, the following tests shall also be carried out.

a) Soundness test, metallurgical tests and magnetic particle inspection(MPI) on MCI/SGI caps as acceptance test.

b) All hot dip galvanized components shall be subject to check for uniformity of thickness and weight of zinc coating on sample basis as an acceptance test.

c) The bending test shall be carried out at 50% minimum failing loads in four directions as a routine test and at 100% minimum failing load in four directions as an acceptance test.

d) Acceptance norms for visual defects allowed at site and also at works shall be agreed in the quality plan

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APPENDIX - A

CORONA AND RADIO INTERFERENCE VOLTAGE (RIV) TEST

1.0 General:

Unless otherwise stipulated, all equipment together with its associated connectors, where applicable, shall be tested for external corona both by observing the voltage level for the extinction of visible corona under failing power frequency voltage and by measurement of radio interference voltage (RIV).

2.0 Test Levels:

The test voltage levels for measurement of external RIV and for corona extinction voltage are listed under the relevant clauses of the specification.

3.0 Test Methods for RIV:

3.1 RIV tests shall be made according to measuring circuit as per CISPR Publication 16-1(1993) Part -1. The measuring circuit shall preferably be tuned to frequency within 10% of 0.5 MHz but other frequencies in the range of 0.5 MHz to 2 MHz may be used, the measuring frequency being recorded. The results shall be in microvolts.

3.2 Alternatively, RIV tests shall be in accordance with NEMA standard Publication No. 107-1964, except otherwise noted herein.

3.3 Temporary additional external corona shielding may be provided in measurement of RIV. Only standard fittings of identical type supplied with the equipment and a simulation of the connections as used in the actual installation will be permitted within 3.5 meters of terminals.

3.4 Ambient noise shall be measured before and after each series of tests to ensure that there is no variation in ambient noise level. If variation is present, the lowest ambient noise level will form basis for the measurements. RIV levels shall be measured at increasing and decreasing voltages of 85%, 100%, 115% and 130% of the specified RIV test voltage for all equipment unless otherwise specified. The specified RIV test voltage for 765kV, 400 kV and 220 kV is listed in Section -1/ Section -2 of the specification together with maximum permissible RIV level in micro-volts.

3.5 The measuring instruments shall be as per CISPR recommendation or equivalent device so long as it has been used by other testing authorities.

3.6 The RIV measurement may be made with a noise meter. A calibration procedure of the frequency to which noise meter shall be tuned shall establish the ratio of voltage at the high voltage terminal to voltage read by noises meter.

4.0 Test Methods Visible Corona

The purpose of this test is to determine the corona extinction voltage of apparatus, connectors etc. The test shall be carried out in the same manner as RIV test described above with the exception that RIV measurements are not required during test and a search technique shall be used near the onset and extinction voltages, when the test voltage is raised and lowered to determine their precise values. The test voltage shall be raised to 130% of RIV test voltage and maintained for five minutes. The voltage will then be decreased slowly until visible corona disappears. The procedure shall be repeated at least four times with corona inception and extinction voltage recorded each time. The corona extinction voltage for purpose of determining compliance with the specification shall be the lowest of the four values at which visible corona (negative or positive polarity) disappears. Photographs with laboratory in complete darkness shall be taken under test conditions, at all voltage steps i.e. 85%, 100%, 115% and 130%. Additional photographs shall be taken at corona inception and extinction voltages. At least two views shall The photographed in each case using Panchromatic film with an ASA daylight rating of 400 with an exposure of two minutes at a lens aperture of f/5.6 or equivalent. The photographic process shall be such that prints are available for inspection and comparison with conditions as determined from direct observation. Photographs shall be taken from above and below the level of connector so as to show corona on bushing, insulators and all parts of energised connectors. The photographs shall be framed such that test object essentially, fills the frame with no cut-off.

The test shall be recorded on each photograph. Additional photographs shall be taken from each camera position with lights on to show the relative position of test object to facilitate precise corona location from the photographic evidence.

In addition to photographs of the test object, at least four photographs shall be taken of the complete test assembly showing relative positions of all the test equipment and test objects. These four photographs shall be taken from four points equally spaced around the test arrangement to show its features from all sides. Drawings of the laboratory and test set up locations shall be provided to indicate camera positions and angles. The precise location of camera shall be approved by Purchaser's inspector, after determining the best camera locations by that energisation of test object at a voltage which results in corona.

The test to determine the visible corona extinction voltage need not be carried out simultaneously with test to determine RIV levels.

However, both tests shall be carried out with the same test set up and as little time duration between tests as possible. No modification on treatment of the sample between tests will be allowed. Simultaneous RIV and visible corona extinction voltage testing may be permitted at the discretion of Purchaser's inspector if, in his opinion, it will not prejudice other test.

5.0 Test Records:

In addition to the information previously mentioned and the requirements specified as per CISPR or NEMA 107-1964 the following data shall be included in test report:

a) Background noise before and after test.
b) Detailed procedure of application of test voltage.
c) Measurements of RIV levels expressed in microvolts at each level.

d) Results and observations with regard to location and type of interference sources detected at each step.

e) Test voltage shall be recorded when measured RIV passes through 100 microvolts in each direction.

Onset and extinction of visual corona for each of the four tests required shall be recorded.

SECTION-3

PROJECT DETAILS & GENERAL SPECIFICATION

SITE INFORMATION

	Particular	Details
a)	Owner	UP POWER TRANSMISSION CORPORATION Ltd
b)	Customer	POWERGRID
c)	Project Title	765kV/400kV Agra UPPTCL (New)Substation
d)	Location	AGRA
e)	Transport Facilities	RAOD/TRAIN
	SITE CONDITIONS	
a)	Max. ambient air temp.	50°C
b)	Min. ambient air temp.	0°C
c)	Max. design ambient temp.	50°C
d)	Design reference temp.	50°C
e)	Average Humidity	Max. 100%
f)	Special corrosion conditions	No
g)	Solar Radiation	1.2kW/sqmtr
h)	Atmospheric UV radiation	High
i)	Altitude above sea level	Less than 1000meter
j)	Pollution Severity	High Pollution level (25mm/kV)
k)	Seismic Zone	As per the seismic zone defined in the relevant BIS but not less than 0.3g horrizontal
	WIND DATA	
	Wind velocity	As per IS
	Average No. of thunderstorm days per annum	As per IS

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.

Auxiliary supplies as described below would be available at site.

Normal Voltage (Volts)	Variation in voltage	Frequency (Hz)	Phase	Neutral connection
415	+ 10 %	50 + 5 %	3 Ph- 4wire	Solidly earthed
240	+ 10 %	50 + 5 %	1 Ph-2wire	Solidly earthed
220	+ 10 %	DC		Isolated(2 wire system)
48		DC		Isolated(2 wire system) (+ Earthed)

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.

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 (If in the scope of Bidder)

a) The support structures should be hot dip galvanised with minimum 610 gram/m2 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 bidder 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 POWERGRID's approval.

5.0 ENGINEERING DATA AND DRAWINGS

5.1 The list of drawings/documents which are to be submitted to the Purchaser shall be discussed and finalised by the Purchaser at the time of award.The supplier shall necessarily submit all the drawings/ documents unless anything is waived.

5.2 The Contractor shall submit 4 (four) sets of drawings/ design documents /data / detailed bill of quantity and 1 (one) set of test reports for the approval of the Purchaser. The contractor shall also submit the softcopy of the above documents in addition to hardcopy.

5.3 Drawings

5.3.1 All drawings submitted by the Contractor shall be in sufficient detail to indicate the type, size, arrangement, material description, Bill of Materials, weight of each component, break-up for packing and shipment, dimensions, internal & the external connections, fixing arrangement required and any other information specifically requested in the specifications.

5.3.2 Drawings submitted by the Contractor shall be clearly marked with the name of the Purchaser, the unit designation, the specifications title, the specification number and the name of the Project. POWERGRID has standardized a large number of drawings/documents of various make including type test reports which can be used for all projects having similar requirements and in such cases no project specific approval (except for list of applicable drawings alongwith type test reports) is required. However, distribution copies of standard drawings/documents shall be submitted as per provision of the contract. All titles, noting, markings and writings on the drawing shall be in English. All the dimensions should be in SI units.

5.3.3 The review of these data by the Purchaser 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 substation layout. This review by the Purchaser 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 Purchaser 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.

5.4 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 Purchaser. Approval of Contractor's drawing or work by the Purchaser shall not relieve the contractor of any of his responsibilities and liabilities under the Contract.

5.5 All engineering data submitted by the Contractor after final process including review and approval by the Purchaser shall form part of the Contract Document and the entire works performed under these specifications shall be performed in strict conformity, unless otherwise expressly requested by the Purchaser in Writing.

5.7 Approval Procedure

The scheduled dates for the submission of the drawings as well as for, any data/information to be furnished by the Purchaser would be discussed and finalised at the time of award. The following schedule shall be followed generally for approval and for providing final documentation.

i)	Approval/comments/ Purchaser on initial	As per agreed by schedule submission
ii)	Resubmission (whenever required)	Within 3 (three) weeks from date of comments
iii)	Approval or comments	Within 3 (three) weeks of receipt of resubmission.
iv)	Furnishing of distribution copies (5 hard copies per substation and one scanned copy (pdf format) for Corporate Centre)	2 weeks from the date of approval
v)	Furnishing of distribution copies of test reports	
(a)	Type test reports (one scanned softcopy in pdf format per substationplus one for corporate centre & one hardcopy per substation)	2 weeks from the date of final approval
(b)	Routine Test Reports (one copy for each substation)	-do-
vi)	Furnishing of instruction/ manuals (2 copies per substation and one softcopy (pdf format) for corporate centre & per substation)	As per agreed schedule operation
(vii)	As built drawings (two sets of hardcopy per substation & one softcopy (pdf format) for corporate centre& per substation)	On completion of entire works

NOTE :

(1) The supplier may please note that all resubmissions must incorporate all comments given in the earlier submission by BHEL/POWERGRID or adequate justification for not incorporating the same must be submitted failing which the submission of documents is likely to be returned.

(2) All drawings should be submitted in softcopy form, however substation design drawings like SLD, GA, all layouts etc. shall also be submitted in AutoCAD Version. SLD, GA & layout drawings shall be submitted for the entire substation in case of substation extension also.

(3) The instruction Manuals shall contain full details of drawings of all equipment being supplied under this contract, their exploded diagrams with complete instructions for storage, handling, erection,commissioning,testing, operation, trouble shooting, servicing and overhauling procedures.

(4) If after the commissioning and initial operation of the substation, the instruction manuals require any modifications/ additions/changes, the same shall be incorporated and the updated final instruction manuals shall

be submitted by the supplier to BHEL/POWERGRID.

(5) The manufacturer shall furnish to the Purchaser catalogues of spare parts.

(6) All As-built drawings/documents shall be certified by site indicating the changes before final submission.

6.0 MATERIAL WORKMANSHIP

6.1 General Requirement

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

6.1.2 Incase where the equipment, materials or components are indicated in the specification as “similar” to any special standard, the Purchaser shall decide upon the question of similarity. When required by the specification or when required by the Purchaser the Contractor shall submit, for approval, all the information concerning the materials or components to be used in manufacture. Machinery, equipment, materials and components supplied, installed or used without such approval shall run the risk of subsequent rejection, it being understood that the cost as well as the time delay associated with the rejection shall be borne by the supplier.

6.1.3 The design of the Works shall be such that installation, future expansions, replacements and general maintenance may be undertaken with a minimum of time and expenses. Each component shall be designed to be consistent with its duty and suitable factors of safety, subject to mutual agreements. All joints and fastenings shall be devised, constructed and documented so that the component parts shall be accurately positioned and restrained to fulfill their required function. In general, screw threads shall be standard metric threads. The use of other thread forms will only be permitted when prior approval has been obtained from the BHEL/POWERGRID.

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

6.1.5 All materials and equipment shall be installed in strict accordance with the manufacturer’s recommendation(s). Only first-class work in accordance with the best modern practices will be accepted. Installation shall be considered as being the erection of equipment at its permanent location. This, unless otherwise specified, shall include unpacking, cleaning and lifting into position, grouting, levelling, aligning, coupling of or bolting down to previously installed equipment bases/foundations, performing the alignment check and final adjustment prior to initial operation, testing and commissioning in accordance with the manufacturer’s tolerances, instructions and the Specification. All factory assembled rotating machinery shall be checked for alignment and adjustments made as necessary to re-establish the manufacturer’s limits suitable guards shall be provided for the protection of

personnel on all exposed rotating and / or moving machine parts and shall be designed for easy installation and removal for maintenance purposes. The spare equipment(s) shall be installed at designated locations and tested for healthiness.

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

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

6.1.8 Corona and radio interference voltage test and seismic withstand test (for 132kV and above voltage level) procedures for equipments shall be in line with the procedure given at Annexure-A and B respectively.

6.2 Provisions For Exposure to Hot and Humid climate

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

6.2.1 Space Heaters

6.2.1.1 The heaters shall be suitable for continuous operation at 240V as supply voltage. On-off switch and fuse shall be provided.

6.2.1.2 One or more adequately rated thermostatically connected heaters shall be supplied to prevent condensation in any compartment. The heaters shall be installed in the compartment and electrical connections shall be made sufficiently away from below the heaters to minimize deterioration of supply wire insulation. The heaters shall be suitable to maintain the compartment temperature to prevent condensation.

6.2.1.3 Suitable anti condensation heaters with the provision of thermostat shall be provided.

6.2.2 FUNGI STATIC VARNISH

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

6.2.3 Ventilation opening

Wherever ventilation is provided, the compartments shall have ventilation openings with fine wire mesh of brass to prevent the entry of insects and to reduce to a minimum the entry of dirt and dust. Outdoor compartment openings shall be provided with shutter type blinds and suitable provision shall be made so as to avoid any communication of air / dust with any part in

the enclosures of the Control Cabinets, Junction boxes and Marshalling Boxes, panels etc.

6.2.4 Degree of Protection

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

a) Installed out door: IP- 55
b) Installed indoor in air conditioned area: IP-31
c) Installed in covered area: IP-52
d) Installed indoor in non air conditioned area where possibility of entry of water is limited: IP-41.
e) For LT Switchgear (AC & DC distribution Boards) : IP-52

The degree of protection shall be in accordance with IS:13947 (Part-I) / IEC-60947(Part-I) / IS 12063 / IEC-60529. Type test report for degree of protection test, shall be submitted for approval.

6.3 RATING PLATES, NAME PLATES AND LABELS

Each main and auxiliary item of substation is to have permanently attached to it in a conspicuous position a rating plate of non-corrosive material upon which is to be engraved manufacturer's name, year of manufacture, equipment name, type or serial number together with details of the loading conditions under which the item of substation in question has been designed to operate, and such diagram plates as may be required by the Purchaser. The rating plate of each equipment shall be according to IEC requirement.

All such nameplates, instruction plates, rating plates of transformers, reactors, CB, CT, CVT, SA, Isolators, C & R panels and PLCC equipments shall be bilingual with Hindi inscription first followed by English. Alternatively two separate plates one with Hindi and the other with English inscriptions may be provided.

6.4 FIRST FILL OF CONSUMABLES, OIL AND LUBRICANTS

All the first fill of consumables such as oils, lubricants, filling compounds, touch up paints, soldering/brazing material for all copper piping of circuit breakers and essential chemicals etc. which will be required to put the equipment covered under the scope of the specifications, into successful Operation, shall be furnished by the supplier unless specifically excluded under the exclusions in these specifications and documents.

7.0 DESIGN IMPROVEMENTS / COORDINATION

7.1 The bidder shall note that the equipment offered by him in the bid only shall be accepted for supply. However, the Purchaser or the Contractor may propose changes in the specification of the equipment or quality thereof and if the Purchaser & contractor agree upon any such changes, the specification shall be modified accordingly.

7.2 If any such agreed upon 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.

7.3 The supplier shall be responsible for the selection and design of

appropriate equipments to provide the best co-ordinated performance of the entire system. The basic design requirements are detailed out in this Specification. The design of various components, sub-assemblies and assemblies shall be so done that it facilitates easy field assembly and maintenance.

7.4 The supplier has to coordinate designs and terminations with the agencies (if any) who are Consultants/Contractor for the Purchaser. The names of agencies shall be intimated to the successful bidders.

7.5 The supplier will be called upon to attend design co-ordination meetings with the Engineer, other Contractor's and the Consultants of the Purchaser (if any) during the period of Contract. The Contractor shall attend such meetings at his own cost at POWERGRID Corporate Centre, Gurgaon (Haryana) or at mutually agreed venue as and when required and fully cooperate with such persons and agencies involved during those discussions.

8.0 QUALITY ASSURANCE PROGRAMME

8.1 To ensure that the equipment and services under the scope of this Contract whether manufactured or performed within the supplier's Works or at his Sub- contractor's premises or at the Purchaser's site or at any other place of Work are in accordance with the specifications, the supplier shall adopt suitable quality assurance programme to control such activities at all points necessary. The detailed programme shall be submitted by the contractor after the award for reference. A quality assurance programme of the supplier shall generally cover the following:

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

(b) Documentation control system;

(c) Qualification data for 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) Control of non-conforming items and system for corrective actions;

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

(h) Control of calibration and testing of measuring instruments and field activities;

(i) System for indication and appraisal of inspection status;

(j) System for quality audits;

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

(l) System for maintenance of records;

(m) System for handling storage and delivery; and

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

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

8.2 Quality Assurance Documents

The supplier would be required to submit all the Quality Assurance Documents as stipulated in the Quality Plan at the time of POWERGRID/BHEL inspection of equipment/material

9.0 TYPE TESTING, INSPECTION, TESTING & INSPECTION CERTIFICATE

9.1 All equipment being supplied shall conform to type tests as per technical specification and shall be subject to routine tests in accordance with requirements stipulated under respective sections.

9.2 The reports for all type tests as per technical specification shall be furnished by the supplier alongwith equipment / material drawings. However, type test reports of similar equipments/ material already accepted in POWERGRID shall be applicable for all project with similar requirement. 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 accreditation body of the country where laboratory is located) or witnessed by POWERGRID or representative authorized by POWERGRID or Utility or representative of accredited test lab or reputed consultant.

The test reports submitted shall be of the tests conducted within last 10 (ten) years prior to the date of bid opening i.e. 26.08.11. In case the test reports are of the test conducted earlier than 10 (ten) years prior to the date of bid opening, the contractor shall repeat these test(s) at no extra cost to BHEL.

However, in case of instrument transformers, the following type tests should have been conducted within 5 (five) years prior to the date of bid opening.

i) Lightning Impulse Test

ii) Switching ImpulseTest

iii) Multiple Chopped Impulse Test (For CT)

iv) Chopped Impulse Test (For CVT)

In case the test reports are of these tests (for instrument transformers) as mentioned above are conducted earlier than 5 (five) years prior to the date of bid opening i.e. 26.08.11, the contractor shall repeat these test(s) at no extra cost to the purchaser.

Further, 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 type tests not carried out, same shall be carried out without any additional cost implication to the Purchaser.
The supplier shall intimate the BHEL/POWERGRID the detailed program about the tests atleast two (2) weeks in advance in case of domestic supplies & six (6) weeks in advance in case of foreign supplies.

Further, in case type tests are required to be conducted/repeated and the deputation of Inspector/Purchaser's representative is required, then all

the expenses shall be borne by the supplier.

9.3 The Purchaser intends to repeat the type tests on Power Transformer and Shunt Reactor except Dynamic short circuit tests on transformers, for which test charges shall be payable as per provision of contract. The price of conducting 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. BHEL/POWERGRID reserves the right to witness any or all the type tests. The BHEL/POWERGRID also reserves the right to waive the repeating of type tests partly or fully and in case of waival, test charges for the same shall not be payable.

The Purchaser shall bear all expenses for deputation of purchaser's representative(s) for witnessing the type tests under this clause except in the case of re-deputation if any, necessitated due to no fault of the purchaser.

For outdoor receptacles, trefoil clamps, diesel engine, alternator, motors, cable glands, lighting fixtures, ACSR/AAC conductor, IPS aluminum tube and junction boxes, type test reports are not required to be submitted for the makes indicated at Annexure-E /POWERGRID approved list of subvendors. For the new makes(other than those indicated at Annexure-E / POWERGRID approved list of subvendors), type test reports as per relevant standard shall be submitted for POWERGRID's approval.

9.4 The Purchaser, his duly authorised representative and/or outside inspection agency acting on behalf of the Purchaser shall have at all reasonable times free access to the Contractor's/sub-vendors 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 if part of the Works is being manufactured or assembled at other premises or works, the Contractor shall obtain for the Engineer 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. Inspection may be made at any stage of manufacture, despatch or at site at the option of the Purchaser and the equipment if found unsatisfactory due to bad workmanship or quality, material is liable to be rejected.

9.5 The supplier shall give the Purchaser /Inspector fifteen (15) days written notice for on-shore and six (6) weeks notice for off-shore material being ready for joint testing including contractor and POWERGRID. Such tests shall be to the Contractor's account except for the expenses of the Inspector. The Purchaser/inspector, unless witnessing of the tests is virtually waived, will attend such tests within fifteen (15) days of the date of which the equipment is notified as being ready for test/inspection, failing which the Contractor may proceed alone with the test which shall be deemed to have been made in the Inspector's presence and he shall forthwith forward to the Inspector duly certified copies of tests in triplicate.

9.6 The Purchaser or Inspector shall, within fifteen (15) 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 Purchaser /Inspector giving reasons therein, that no modifications are necessary to comply with the Contract.

9.7 When the factory tests have been completed at the Contractor's or Sub- Contractor's works, the Purchaser/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 Purchaser /Inspector, the certificate shall be issued within fifteen (15) days of receipt of the Contractor's Test certificate by the Engineer/Inspector. Failure of the Purchaser /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 Purchaser to accept the equipment should, it, on further tests after erection, be found not to comply with the Contract. The equipment shall be dispatched to site only after approval of test reports and issuance of CIP by the Purchaser.

9.8 In all cases where the Contract provides for tests whether at the premises or at the 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 Purchaser /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 Purchaser /Inspector or to his authorised representative to accomplish testing.

9.9 The inspection by Purchaser 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.

9.10 The Purchaser 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.

9.11 The Purchaser reserves the right for getting any field tests not specified in respective sections of the technical specification conducted on the completely assembled equipment at site. The testing equipments for these tests shall be provided by the Purchaser.

10.0 TESTS

10.1 Pre-commissioning Tests

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 Purchaser 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 respective chapters and shall be included in the Contractor's quality assurance programme.

10.2 Commissioning Tests

10.2.1 The available instrumentation and control equipment will to be used during such tests and the Purchaser will calibrate, all such measuring equipment and

devices as far as practicable.

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

10.2.3 The specific tests requirement on equipment have been brought out in the respective chapters of the technical specification.

10.3 The Contractor shall be responsible for obtaining statutory clearances from the concerned authorities for commissioning the equipment and the switchyard. However necessary fee shall be reimbursed by POWERGRID on production of requisite documents.

11.0 PACKAGING & PROTECTION

11.1 All the equipments shall be suitably protected, coated, covered or boxed and crated to prevent damage or deterioration during transit, handling and storage at Site till the time of erection. On request of the Purchaser, the Contractor shall also submit packing details/associated drawing for any equipment/material under his scope of supply, to facilitate the Purchaser to repack any equipment/material at a later date, in case the need arises. While packing all the materials, the limitation from the point of view of availability of Railway wagon sizes in India should be taken into account. The Contractor shall be responsible for any loss or damage during transportation, handling and storage due to improper packing. Any demurrage, wharfage and other such charges claimed by the transporters, railways etc. shall be to the account of the Contractor. Purchaser takes no responsibility of the availability of the wagons.

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

12.0 FINISHING OF METAL SURFACES

12.1 All metal surfaces shall be subjected to treatment for anti-corrosion protection. All ferrous surfaces for external use unless otherwise stated elsewhere in the specification or specifically agreed, shall be hot-dip galvanized after fabrication. High tensile steel nuts & bolts and spring washers shall be electro galvanized to service condition 4.All steel conductors including those used for earthing/grounding (above ground level) shall also be galvanized according to IS:2629.

12.2 HOT DIP GALVANISING

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

12.2.2 The galvanized surfaces shall consist of a continuous and uniform thick coating of zinc, firmly adhering to the surface of steel. The finished surface shall be clean and smooth and shall be free from defects like discoloured patches, bare spots, unevenness of coating, spelter which is loosely attached to the steel globules, spiky deposits, blistered surface, flaking or peeling off, etc. The presence of any of these defects noticed on visual or microscopic inspection

shall render the material liable to rejection.

12.2.3 After galvanizing. no drilling or welding shall be performed on the galvanized parts of the equipment excepting that nuts may be threaded after galvanizing. Sodium dichromate treatment shall be provided to avoid formation of white rust after hot dip galvanization.

12.2.4The galvanized steel shall be subjected to six one minute dips in copper sulphate solution as per IS-2633.

12.2.5 Sharp edges with radii less than 2.5 mm shall be able to withstand four immersions of the Standard Preece test. All other coatings shall withstand six immersions. The following galvanizing tests should essentially be performed as per relevant Indian Standards.

- Coating thickness
- Uniformity of zinc
- Adhesion test
- Mass of zinc coating

12.2.6 Galvanised material must be transported properly to ensure that galvanised surfaces are not damaged during transit. Application of zinc rich paint at site shall not be allowed.

12.3 PAINTING

12.3.1All sheet steel work shall be degreased, pickled, phosphated in accordance with the IS-6005 “Code of practice for phosphating iron and sheet”. All surfaces, which will not be easily accessible after shop assembly, shall beforehand be treated and protected for the life of the equipment. The surfaces, which are to be finished painted after installation or require corrosion protection until installation, shall be shop painted with at least two coats of primer. Oil, grease, dirt and swaf shall be thoroughly removed by emulsion cleaning. Rust and scale shall be removed by pickling with dilute acid followed by washing with running water, rinsing with slightly alkaline hot water and drying.

12.3.2 After phosphating, thorough rinsing shall be carried out with clean water followed by final rinsing with dilute dichromate solution and oven drying. The phosphate coating shall be sealed with application of two coats of ready mixed, stoving type zinc chromate primer. The first coat may be “flash dried” while the second coat shall be stoved.

12.3.3 After application of the primer, two coats of finishing synthetic enamel paint shall be applied, each coat followed by stoving. The second finishing coat shall be applied after inspection of first coat of painting.

12.3.4 The exterior and interior colour of the paint in case of new substations shall preferably be RAL 7032 for all equipment, marshalling boxes, junction boxes, control cabinets, panels etc. unless specifically mentioned under respective sections of the equipments. Glossy white colour inside the equipments /boards/panels/junction boxes is also acceptable. The exterior colour for panels shall bematching with the existing panels in case of extension of a substation. Each coatof primer and finishing paint shall be of slightly different shade to enable inspection of the painting. A small quantity of finishing paint shall be supplied for minor touching up required at site after installation of the equipments.

12.3.5 In case the Bidder proposes to follow his own standard surface finish and protection procedures or any other established painting procedures, like electrostatic painting etc., the procedure shall be submitted alongwith the Bids for Purchaser's review & approval.

12.3.6 The colour scheme as given below shall be followed for Fire Protection and Air
Conditioning systems

S.No.	PIPE LINE	Base colour	Band colour
Fire Protection System			
1	Hydrant and Emulsifier system pipeline	FIRE RED	-
2	Emulsifier system detection line – water	FIRE RED	Sea Green
3	Emulsifier system detection line – Air	FIRE RED	Sky Blue
4	Pylon support pipes	FIRE RED	
Air Conditioning System			
5	Refrigerant gas pipeline – at compressor suction	Canary Yellow	-
6	Refrigerant gas pipeline – at compressor discharge	Canary Yellow	Red
7	Refrigerant liquid pipeline	Dark Admiralty Green	-
8	Chilled water pipeline	Sea Green	-
9	Condenser water pipeline	Sea Green	Dark Blue

12.3.7 For aluminium casted surfaces, the surface shall be with smooth finish. Further, in case of aluminium enclosures the surface shall be coated with powder (coating thickness of 60 microns) after surface preparation for painting.

13.0 HANDLING, STORING AND INSTALLATION

13.1 In accordance with the specific installation instructions as shown on manufacturer's drawings or as directed by the Purchaser or his representative, the Contractor shall unload, store, erect, install, wire, test and place into commercial use all the 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.

13.2 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.

13.3 The contractor shall have to ensure that the hard and flat indoor and outdoor storage areas are in place prior to commencement of delivery of material at site. Contractor shall also ensure availability of proper unloading and material handling equipment like cranes etc. and polyester/nylon ropes of

suitable capacity to avoid damage during unloading and handling of material at site. All indoor equipments shall be stored indoors. Outdoor equipment may be stored outdoors but on a hard and flat raised area properly covered with waterproof and dustproof covers to protect them from water seepage and moisture ingress. However, all associated control panels, marshalling boxes operating boxes etc. of outdoor equipments are to be stored indoors only.Storage of equipment on top of another one is not permitted if the wooden packing is used. Material opened for joint inspection shall be repacked properly as per manufacturer's recommendations.During storage of material regular periodic monitoring of important parameters like oil level / leakage, SF6 / Nitrogen pressure etc. shall be ensured by the contractor.

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

13.5 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 properoperation of circuit breakers,isolators and their operating mechanisms. All components shall beprotected 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.

13.6 Supplier shall be responsible for examining all the shipment and notify the Purchaser immediately of any damage, shortage, discrepancy etc. for the purpose of Purchaser's information only. The Contractor shall submit to the Purchaser every week a report detailing all the receipts during the weeks. However, the Contractor shall be solely responsible for any shortages or damages in transit, handling and/or in storage and erection of the equipment at Site Any demurrage, wharfage and other such charges claimed by the transporters, railways etc. shall be to the account of the Contractor.

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

13.8 Where material / equipment is unloaded by Purchaser before the Contractor arrives at site or even when he is at site, Purchaser 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.

13.9 The Contractor shall be responsible for making suitable indoor storage facilities, to store all equipment which requires indoor storage.

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

13.11 Exposed live parts shall be placed high enough above ground to meet

the requirements of electrical and other statutory safety codes.

13.12 Equipment Bases

A cast iron or welded steel base plate shall be provided for all rotating equipment which is to be installed on a concrete base unless otherwise agreed to by the Purchaser. Each base plate shall support the unit and its drive assembly, shall be of a neat design with pads for anchoring the units, shall have a raised lip all around, and shall have threaded drain connections.

14.0 TOOLS AND TACKLES

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

15.0 AUXILIARY SUPPLY

15.1 The sub-station auxiliary supply is normally met through a system indicated under section "Electrical & Mechanical Auxiliaries" having the following parameters. The auxiliary power for station supply, including the equipment drive, cooling system of any equipment, air-conditioning, lighting etc shall be designed for the specified Parameters as under. The DC supply for the instrumentation and PLCC system shall also conform the parameters as indicated in the following.

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
48V	_	DC	_	2 wire system (+) earthed

Combined variation of voltage and frequency shall be limited to ± 10%.

16.0 SUPPORT STRUCTURE (If in the scope of supplier)

16.1 The equipment support structures shall be suitable for equipment connections at the first level i.e 14.0 meter, 8.0 meter and 5.9 meter from plinth level for 765 kV,420 kV and 245 kV substations respectively. All equipment support structures shall be supplied alongwith brackets, angles, stools etc. for attaching the operating mechanism, control cabinets & marshalling box (wherever applicable) etc.

16.2 Support structure shall meet the following mandatory requirements:

16.2.1 The minimum vertical distance from the bottom of the lowest porcelain part of the bushing, porcelain enclosures or supporting insulators to the bottom of the equipment base, where it rests on the foundation pad shall be 2.55 metres.

17.0 CLAMPS AND CONNECTORS INCLUDING TERMINAL CONNECTORS

17.1 All power clamps and connectors shall conform to IS:5561 & NEMA CC1 and shall be made of materials listed below :

a) For connecting Aluminum alloy casting,

		ACSR conductors	conforming to designation A6 of IS:617 and all test shall conform to IS:617
b)		For connecting equipment ter-minals made of copper with ACSR conductors	Bimetallic connectors made from aluminum alloy casting, conforming to designation A6 of IS:617 with 2mm thick bimetallic liner and all test shall conform to IS:617
c)		For connecting G.I	Galvanised mild steel shield
d)	i)	Bolts, nuts & Plain, washers	i) Electrogalvanised for sizes below M12, for others hot dip galvanised.
	ii)	Spring washers items 'a' to 'c'	ii) Electro-galvanised mild for steel suitable for atleast service condition-3 as per IS:1573

17.2 Necessary clamps and connectors shall be supplied for all equipment and connections.The requirement regarding external corona and RIV as specified for any equipment shall include its terminal fittings. If corona rings are required to meet these requirements they shall be considered as part of that equipment and included in the scope of work.

17.3 Where copper to aluminum connections are required, bi-metallic clamps shall be used, which shall be properly designed to ensure that any deterioration of the connection is kept to a minimum and restricted to parts which are not current carrying or subjected to stress.

17.4 Low voltage connectors, grounding connectors and accessories for grounding allequipment as specified in each particular case, are also included in the scope of Work.

17.5 No current carrying part of any clamp shall be less than 10 mm thick. All ferrous parts shall be hot dip galvanised. Copper alloy liner of minimum 2 mm thickness shall be cast integral with aluminum body or 2 mm thick bi-metallic strips shall be provided for Bi-metallic clamps.

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

17.7 Flexible connectors, braids or laminated straps made for the terminal clamps for bus posts shall be suitable for both expansion or through (fixed/sliding) type connection of 4" IPS AL. tube as required. In both the cases the clamp height (topof the mounting pad to centre line of the tube) should be same.

17.8 Clamp shall be designed to carry the same current as the conductor and the temperature rise shall be equal or less than that of the conductor at the specified ambient temperature. The rated current for which the clamp/connector is designed with respect to the specified reference ambient temperature, shall also be indelibly marked on each component of the clamp/connector, except on the hardware.

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

17.10 Clamps and connectors shall be designed to be corona controlled.

17.11 Tests

17.11.1 Clamps and connectors should be type tested as per IS:5561 and shall also be subjected to routine tests as per IS:5561. Following type test reports shall be submitted for approval as per clause 9.2 above except for sl. no.(ii) & (iii) for which type test once conducted shall be applicable (i.e. the requirement of test conducted within last ten years shall not be applicable).

i) Temperature rise test (maximum temperature rise allowed is 35°C over 50°C ambient)

ii) Short time current test

iii) Corona (dry) and RIV (dry) test (for 220 KV and above voltage level clamps)

iv) Resistance test and tensile test

18.0 CONTROL CABINETS, JUNCTION BOXES, TERMINAL BOXES & MARSHALLING BOXES FOR OUTDOOR EQUIPMENT

18.1 All types of boxes, cabinets etc. shall generally conform to & be tested in accordance with IS-5039/IS-8623, IEC-60439, as applicable, and the clauses given below:

18.2 Control cabinets, junction boxes, Marshalling boxes & terminal boxes shall be made of sheet steel or aluminum enclosure and shall be dust, water and vermin proof. Sheet steel used shall be atleast 2.0 mm thick cold rolled or 2.5 mm hot rolled or alternately 1.6 mm thick stainless steel can also be used. 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 aluminum enclosed box the thickness of aluminum shall be such that it provides adequate rigidity and long life as comparable with sheet steel of specified thickness.

18.3 A canopy and sealing arrangements for operating rods shall be provided inmarshalling boxes / Control cabinets to prevent ingress of rain water.

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

18.5 All doors, removable covers and plates shall be gasketed all around with suitably profiled EPDM/Neoprene gaskets. The gasket shall be tested in accordance with approved quality plan, IS:11149 and IS:3400. Ventilating Louvers, if provided, shall have screen and filters. The screen shall be fine wire mesh made of brass.

18.6 All boxes/cabinets shall be designed for the entry of cables from bottom by meanof weather proof and dust-proof connections. Boxes and cabinets shall be designed with generous clearances to avoid interference between the wiring entering from below and any terminal blocks or accessories mounted within the box or cabinet. Suitable cable gland plate above the base of the marshalling kiosk/box shall be provided for this purpose along with the proper blanking plates. Necessary number of cable glands shall be supplied and fitted on this gland plate. Gland plate shall have provision for some future glands to be provided later, if required. The Nickel plated glands shall be dust proof, screw on & double compression type and made of brass. The gland shall have

provision for securing armour of the cable separately and shall be provided with earthing tag. The glands shall conform to BS:6121.

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

18.8 For illumination, a fluorescent tube or CFL of approximately 9 to 15 watts shall be provided. The switching of the fittings shall be controlled by the door switch. .

For junction boxes of smaller sizes such as lighting junction box, manual operated earth switch mechanism box etc., plug socket, heater and illumination is not required to be provided.

18.9 All control switches shall be of MCB/rotary switch type and Toggle/piano switches shall not be accepted.

18.10 Positive earthing of the cabinet 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 self etching washer. Earthing of hinged door shall be done by using a separate earth wire.

18.11 The bay marshalling kiosks shall be provided with danger plate and a diagram showing the numbering/connection/feruling by pasting the same on the inside of the door.

18.12 a) The following routine tests alongwith the routine tests as per IS:5039 shall also be conducted:

i) Check for wiring

ii) Visual and dimension check

b) The enclosure of bay marshalling kiosk, junction box, terminal box shall conform to IP-55 as per IS:13947 including application of, 2.5 KV rms for 1 (one) minute, insulation resistance and functional test after IP-55 test.

19.0 Deleted.

20.0 TERMINAL BLOCKS AND WIRING

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

20.2 Terminal blocks shall be 650V grade and have continuous rating to carry the maximum expected current on the terminals and non breakable type. These shall be of moulded piece, complete with insulated barriers, stud type terminals, washers, nuts and lock nuts. Screw clamp, overall insulated, insertion type, rail mounted terminals can be used in place of stud type terminals. But preferably the terminal blocks shall be non-disconnecting stud type of Elmex or Phoenix or Wago
or equivalent make.

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

20.4 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.

20.5 The conducting part in contact with cable shall preferably be tinned or silver

plated however Nickel plated copper or zinc plated steel shall also be acceptable.

20.6 The terminal blocks shall be of extensible design.

20.7 The terminal blocks shall have locking arrangement to prevent its escape from the mounting rails.

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

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

a)	All circuits except CT/PT circuits	Minimum of two of 2.5 sq mm copper flexible.
b)	All CT/PT circuits	Minimum of 4 nos. of 2.5 sq copper flexible.

20.10 The arrangements shall be in such a manner so that it is possible to safely connect or disconnect terminals on live circuits and replace fuse links when the cabinet is live.

20.11 Atleast 20 % spare terminals shall be provided on each panel/cubicle/box and these spare terminals shall be uniformly distributed on all terminals rows.

20.12 There shall be a minimum clearance of 250 mm between the First/bottom row of terminal block and the associated cable gland plate for outdoor ground mounted marshalling box and the clearance between two rows of terminal blocks shall be a minimum of 150 mm.

20.13 The supplier shall furnish all wire, conduits and terminals for the necessary interphase electrical connections (where applicable) as well as between phases and common terminal boxes or control cabinets. For equipments rated for 400 kV and above the wiring required in these items shall be run in metallic ducts or shielded cables in order to avoid surge overvoltages either transferred through the equipment or due to transients induced from the EHV circuits.

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

21.0 LAMPS & SOCKETS

21.1 Sockets

All sockets (convenience outlets) shall be suitable to accept both 5 Amp & 15 Amp pin round Standard Indian plugs. They shall be switched sockets with shutters.

21.2 Hand Lamp:

A 240 Volts, single Phase, 50 Hz AC plug point shall be provided in the interior of each cubicle with ON-OFF Switch for connection of hand lamps.

21.3 Switches and Fuses:

21.3.1 Each panel shall be provided with necessary arrangements for receiving, distributing, isolating and fusing of DC and AC supplies for various control, signalling, lighting and space heater circuits. The incoming

and sub-circuits shall be separately provided with miniature circuit breaker **/** switchfuse units. Selection of the main and Sub-circuit fuse ratings shall be such as to ensure selective clearance of sub-circuit faults. Potential circuits for relaying and metering shall be protected by HRC fuses.

21.3.2 All fuses shall be of HRC cartridge type conforming to IS:9228 mounted on plug-in type fuse bases. Miniature circuit breakers with thermal protection and alarm contacts will also be accepted. All accessible live connection to fuse bases shall be adequately shrouded. Fuses shall have operation indicators for indicating blown fuse condition. Fuse carrier base shall have imprints of the fuse rating and voltage.

22.0 Bushings, Hollow Column Insulators, Support Insulators:

22.1 Bushings shall be manufactured and tested in accordance with IS:2099 & IEC- 60137 while hollow column insulators shall be manufactured and tested in accordance with IEC-62155/IS:5621.The support insulators shall be manufactured and tested as per IS:2544/IEC-60168 and IEC-60273. The insulators shall also conform to IEC-60815 as applicable.The bidder may also offer composite hollow insulators, conforming to IEC-61462.

22.2 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.

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

22.4 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.

22.5 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.

22.6 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.

22.7 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.

22.8 Tests

In bushing, 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 & IS : 5621.

23.0 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 be subjected to routine tests as per applicable standards. The motors shall be of approved make.

23.1 Enclosures

a) Motors to be installed outdoor without enclosure shall have hose proof enclosure equivalent to IP-55 as per IS: 4691. For motors to be installed indoor i.e. inside a box, the motor enclosure, shall be dust proof equivalent to IP-44 as per IS: 4691.

b) Two independent earthing points shall be provided on opposite sides of the motor for bolted connection of earthing conductor.

c) Motors shall have drain plugs so located that they will drain water resulting from condensation or other causes from all pockets in the motor casing.

d) Motors weighing more than 25 Kg. shall be provided with eyebolts, lugs or other means to facilitate lifting.

23.2 Operational Features

a) Continuous motor rating (name plate rating) shall be at least ten (10) percent above the maximum load demand of the driven equipment at design duty point and the motor shall not be over loaded at any operating point of driven equipment that will rise in service.

b) Motor shall be capable at giving rated output without reduction in the expected life span when operated continuously in the system having the particulars as given in Clause 15.0 of this Section.

23.3 Starting Requirements:

a) All induction motors shall be suitable for full voltage direct-on-line starting. These shall be capable of starting and accelerating to the rated speed alongwith the driven equipment without exceeding the acceptable winding temperature even when the supply voltage drops down to 80% of the rated voltage.

b) Motors shall be capable of withstanding the electrodynamic stresses and heating imposed if it is started at a voltage of 110% of the rated value.

c) The locked rotor current shall not exceed six (6) times the rated full load current for all motors, subject to tolerance as given in IS:325.

d) Motors when started with the driven equipment imposing full starting torque under the supply voltage conditions specified under Clause 15.0 shall be capable of withstanding atleast two successive starts from cold condition at room temperature and one start from hot condition without injurious heating of winding. The motors shall also be suitable for three equally spread starts per hour under the above referred supply condition.

e) The locked rotor withstand time under hot condition at 110% of rated voltage shall be more than starting time with the driven equipment of minimum permissible voltage by at least two seconds or 15% of the accelerating time whichever is greater. In case it is not possible to meet the above requirement, the Bidder shall offer centrifugal type speed switch mounted on the motor shaft which shall remain closed for speed lower than 20% and open for speeds above 20% of the rated speed. The speed switch shall be capable of withstanding 120% of the rated speed in either direction of rotation.

23.4 Running Requirements:

a) The maximum permissible temperature rise over the ambient temperature of 50 degree C shall be within the limits specified in IS:325 (for 3 - phase induction motors) after adjustment due to increased ambient temperature specified.

b) The double amplitude of motor vibration shall be within the limits specified in IS: 4729. Vibration shall also be within the limits specified by the relevant standard for the driven equipment when measured at the motor bearings.

c) All the induction motors shall be capable of running at 80% of rated voltage for a period of 5 minutes with rated load commencing from hot condition.

23.5 TESTING AND COMMISSIONING

An indicative list of tests is given below. Contractor shall perform any additional test based on specialities of the items as per the field Q.P./Instructions of the equipment Contractor or Purchaser without any extra cost to the Purchaser. The Contractor shall arrange all instruments required for conducting these tests alongwith calibration certificates and shall furnish the list of instruments to the Purchaser for approval.

(a) Insulation resistance.

(b) Phase sequence and proper direction of rotation.

(c) Any motor operating incorrectly shall be checked to determine the cause and the conditions corrected.

ANNEXURE-A

CORONA AND RADIO INTERFERENCE VOLTAGE (RIV) TEST

1. General

Unless otherwise stipulated, all equipment together with its associated connectors, where applicable, shall be tested for external corona (for 400kV & above) both by observing the voltage level for the extinction of visible corona under falling power frequency voltage and by measurement of radio interference voltage (RIV) for 132kV and above.

2. Test Levels:

The test voltage levels for measurement of external RIV and for corona extinction voltage are listed under the relevant clauses of the specification.

3. Test Methods for RIV:

3.1 RIV tests shall be made according to measuring circuit as per International Special-Committee on Radio Interference (CISPR) Publication 16-1(1993) Part -1. The measuring circuit shall preferably be tuned to frequency

with 10% of 0.5 Mhz but other frequencies in the range of 0.5 MHz to 2 MHz may be used, the measuring frequency being recorded. The results shall be in microvolts.

3.2 Alternatively, RIV tests shall be in accordance with NEMA standard Publication No. 107-1964, except otherwise noted herein.

3.3 In measurement of, RIV, temporary additional external corona shielding may be provided. In measurements of RIV only standard fittings of identical type supplied with the equipment and a simulation of the connections as used in the actual installation will be permitted in the vicinity within 3.5 meters of terminals.

3.4 Ambient noise shall be measured before and after each series of tests to ensure that there is no variation in ambient noise level. If variation is present, the lowest ambient noise level will form basis for the measurements. RIV levels shall be measured at increasing and decreasing voltages of 85%, 100%, and 110% of the specified RIV test voltage for all equipment unless otherwise specified.The specified RIV test voltage for 765kV, 400 kV, 220 KV is listed in the detailed specification together with maximum permissible RIV level in microvolts.

3.5 The metering instruments shall be as per CISPR recommendation or equivalent device so long as it has been used by other testing authorities.

3.6 The RIV measurement may be made with a noise meter. A calibration procedure of the frequency to which noise meter shall be tuned shall establish the ratio of voltage at the high voltage terminal to voltage read by noisel meter.

4. Test Methods for Visible Corona

The purpose of this test is to determine the corona extinction voltage of apparatus, connectors etc. The test shall be carried out in the same manner as RIV test described above with the exception that RIV measurements are not required during test and a search technique shall be used near the onset and extinction voltage, when the test voltage is raised and lowered to determine their precise values. The test voltage shall be raised to 110% of specified corona extinction voltage and maintained there for five minutes. In case corona inception does not take place at 110%, test shall be stopped, otherwise test shall be continued and the voltage will then be decreased slowly until all visible corona disappears. The procedure shall be repeated at least 4 times with corona inception and extinction voltage recorded each time. The corona extinction voltage for purposes of determining compliance with the specification shall be the lowest of the four values at which visible corona (negative or positive polarity) disappears. Photographs with laboratory in complete darkness shall be taken under test conditions, at all voltage steps i.e. 85%, 100%, and 110%. Additional photographs shall be taken at corona inception and extinction voltages. At least two views shall be photographed in each case using Panchromatic film with an ASA daylight rating of 400 with an exposure of two minutes at a lens aperture of f/5.6 or equivalent. The photographic process shall be such that prints are available for inspection and comparison with conditions as determined from direct observation. Photographs shall be taken from above and below the level of connector so as to show corona on bushing, insulators and all parts of energised connectors. The photographs shall be framed such that test object essentially, fills the frame with no cut-off.

For recording purpose, modern devices utilizing UV recording methods such as image intensifier may also be used.

4.1 The test shall be recorded on each photograph. Additional photograph shall be taken from each camera position with lights on to show the relative position of test object to facilitate precise corona location from the photographic evidence.

4.2 In addition to photographs of the test object preferably four photographs shall be taken of the complete test assembly showing relative positions of all the test equipment and test objects. These four photographs shall be taken from four points equally spaced around the test arrangement to show its features from all sides. Drawings of the laboratory and test set up locations shall be provided to indicate camera positions and angles. The precise location of camera shall be approved by Purchaser's inspector, after determining the best camera locations by trial energisation of test object at a voltage which results in corona.

4.3 The test to determine the visible corona extinction voltage need not be carried out simultaneously with test to determine RIV levels.

4.4 However, both test shall be carried out with the same test set up and as little time duration between tests as possible. No modification on treatment of the sample between tests will be allowed. Simultaneous RIV and visible corona extinction voltage testing may be permitted at the discretion of Purchaser's inspector if, in his opinion, it will not prejudice other test.

5. Test Records:

In addition to the information previously mentioned and the requirements specified as per CISPR or NEMA 107-1964 the following data shall be included in test report:

a) Background noise before and after test.

b) Detailed procedure of application of test voltage.

c) Measurements of RIV levels expressed in micro volts at each level.

d) Results and observations with regard to location and type of interference sources detected at each step.

e) Test voltage shall be recorded when measured RIV passes through 100microvolts in each direction.

f) Onset and extinction of visual corona for each of the four tests required shall be recorded.

ANNEXURE-B

SEISMIC WITHSTAND TEST PROCEDURE

The seismic withstanding test on the complete equipment (for 132kV and above)shall be carried out along with supporting structure.

The Bidder shall arrange to transport the structure from his Contractor's premises/POWERGRID sites for the purpose of seismic withstand test only.The seismic level specified shall be applied at the base of the structure. The accelerometers shall be provided at the Terminal Pad of the equipment and any other point as agreed by the Purchaser. The seismic test shall be carried out in all possible combinations of the equipment. The seismic test procedure shall be furnished for approval of the POWERGRID.

SECTION - 4

GUARANTEED TECHNICAL PARTICULARS

Sl. No.	Parameters	
1.	Type	
2.	Voltage class (kV)	
3.	Dry and wet one minute power frequency withstand voltage (kVp)	
4.	Dry lightning impulse withstand voltage (kVp)	
5.	Wet switching surge withstand voltage (kVp)	
6.	Max. RIV (in μV) at specified 50-Hz phase to ground voltage in kV	
7.	Min. Corona extinction voltage (kV rms)	
8.	Total min. cantilever strength (kg)	
9.	Minimum torsional moment	
10.	Total height of insulator (mm)	
11.	P.C.D	
	a. Top (mm)	
	b. Bottom (mm)	
12.	No. of bolts	
	a. Top	
	b. Bottom	
13.	Diameter of bolt holes	
	a. Top (mm)	
	b. Bottom (mm)	
14.	Pollution level as per IEC-815	
15.	Min. total creepage distance (mm)	
16.	Hardware (Inter unit)	
17.	Hardware (for fixing to structure)	
18.	Applicable standard	

NOTE: Bidder to submit GTP in separate sheet for each voltage class of Post Insulators.

Bharat Heavy Electricals Limited
Doc. No. TB-376-316-114
765kV/400kV/66kV/33kV Post Insulator

SECTION-5

S No.	PARTICULARS	765 KV	400 KV	66 KV	33 KV	Yes/No	Remarks
1	Type	Outdoor Cylindrical Porcelain Solid Core Post Insulator	Outdoor Cylindrical Porcelain Solid Core Post Insulator	Outdoor Cylindrical Porcelain Solid Core Post Insulator	Outdoor Cylindrical Porcelain Solid Core Post Insulator		
2	Rated Frequency (Hz)	---50---					
3	System Neutral Earthing.	--Effectively Earthed--					
4	Suitable for:- Rated Voltage (KV) Rated Frequency (Hz)	 800 50	 420 50	 72.5 50	 36 50		
5	One minute power frequency with stand voltage(Wet) (KV)	830	680	140	70		
6	Dry Lightning Impulse withstand test voltage (KV)	±2100	±1425	325	170		
7	Wet Switching surge withstand Voltage (KV)	±1550	±11050	-	-		
8	Minimum creepage distance Total (mm).	20000	10500	1813	900		
9	Corona extinction Voltage (kV rms) Min.	508	320				
10	Height of Insulator (mm).	5700	3650				
11	Top metal fitting pitch circle dia (mm).	225	127				
12	Bottom metal fitting pitch circle dia (mm).	325(8kN)/356(10kN)	300(8kN)/325(10kN)				
13	No. of holes & diameter. i) Top flange ii) Bottom flange	 4 holes of M16 (8kN)/M18(10 kN) 8 holes of Ø18	 4 holes of M16 8 holes of Ø18				
14	Aluminum of corona ring of grade 63401 or 19501 conforming to IS-5082						
15	Powergrid standard approved valid drawings are available						
16	Valid Powergrid standard type test approval (Yes /No)						
17	If Powergrid Approval is not available, . Bidder shall submit valid type test reports and if Type test reports are not accepted bidder shalll conduct typ test free of cost. (free of cost/ Chargeable)						
18	Powergrid approved valid standard quality Plan (Please enclse SMQP) (mention date of validity)						
19	Hot dip galvenised hardware for inter unit stack connection and for fixing to structure are included in scope	Included	Included	Included	Included		

ANNEXURE - A
SCHEDULE OF TECHNICAL DEVIATIONS

Bidder shall list below all technical deviation clause wise w.r.t. tender specifications:

S.No.	Page No.	Clause No.	Deviation	Reason / Justification

Any deviation not specifically brought out in this section shall not be admissible for any commercial implication at later stage. Except to the technical deviations listed in this schedule, bidder's offer shall be considered in full compliance to the tender specifications irrespective of any such deviation indicated / taken elsewhere in the submitted offer.

Date:

Tenderer's Stamp & Signature