



Bharat Heavy Electricals Limited

(High Pressure Boiler Plant)

Tiruchirappalli – 620014, TAMIL NADU, INDIA

CAPITAL EQUIPMENT / MATERIALS MANAGEMENT

ENQUIRY	Phone: +91 431 257 76 53 Fax : +91 431 252 00 31 Email : skaruna@bheltry.co.in Web : www.bhel.com
NOTICE INVITING TENDER	

TWO PART BID Tender to be submitted in two Parts	Enquiry Number: 2851400017	Enquiry Date: 30.01.2014	Due date for submission of quotation: 04.03.2014
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You are requested to quote the Enquiry number date and due date in all your correspondence. This is only a request for quotation and not an order.

Please note that under any circumstances both delayed offer and late offers will not be considered. Hence vendors are requested to ensure that the offer is reaching physically our office before 14.00 hrs on the Date of tender opening.

Item	Description	Quantity
10	Power Supply Distribution in Shop Floor – Supply and Erection/ Installation and Commissioning (75 Items) as per the Technical Specification & Commercial Conditions applicable (to be downloaded from web site www.bhel.com or http://tenders.gov.in)	01 Set

Important points to be taken care during submission of offer:-

- 1. Supply portion: Payment will be made as follows:**
 - a.80% against supply of respective line item**
 - b.20% after completion of E&C of the total system & submission of 10% PBG for total order value (Supply + E&C).**
- 2. Service Portion: 100% Payment will be made on completion of each line item/works and against completion certificate and submission of 10% PBG for total order value (Supply + E&C).**
- 3. The delivery requirement for the supply of the items for the tender is by 01.01.2015**
- 4. In case of any quantity over & above the tolerance limit (of +10%) during the commissioning period (not exceeding 6 months), the vendor may confirm their willingness to supply the same at the original rate mentioned in the offer.**
- 5. Compliance No. IND 01A and Annexure II (Capacity Details) as applicable to the vendor to be filled in and enclosed along with the offer failing which, their offer will not be considered for evaluation.**
- 6. EMD for this Tender will be Rs. 2,00,000/-**

BHEL's General guidelines / instructions (refer [MM/CE/GENL/001-EMD](#)) including bank guarantee formats and list of consortium banks, commercial terms check-list can be downloaded from BHEL web site <http://www.bhel.com> or from the Government tender website <http://tenders.gov.in> (public sector units > Bharat Heavy Electricals Limited page) under above Enquiry reference.

Tenders should reach us before 14:00 hours on the due date
Tenders will be opened at 14:30 hours on the due date
Tenders would be opened in presence of the tenderers who have submitted their offers and who may like to be present

Yours faithfully,
For **BHARAT HEAVY ELECTRICALS LIMITED**

Engineer/ Capital Equipment / MM

PART-A
Pre-Qualification Criteria for the Power distribution in Shop floor
at PEFP Bhandara

Sl. No.	Description	Vendor to confirm
1	Only those vendors, who have supplied, erected, tested and commissioned atleast one shop/ factory power distribution project and other allied works as indicated in the tender in the past five years and such installation presently working satisfactorily more than one year after commissioning, should quote.	
2	List of the customers / companies on which similar / installations supplied & commissioned by the vendor.	
3	Performance certificate from minimum one customer / company (as per the suggestive format given in Annexure-XV) regarding satisfactory performance of the equipment/ electrical installation for a minimum period of one year supplied to them in last five years.	
4	Vendor / Firm should submit the audited copy of last three years (2010-11, 2011-12 & 2012-13) balance sheet and Profit & Loss account.	
5	Vendors should quote for supply, erection, testing and commissioning of the installations and allied equipments as per the entire scope of items identified in the NIT.	
6	Vendor / Firm should have a valid Electrical ESB license – issued by the respective licensing board.	
7	Vendor should have the PAN, TIN and Service Tax Registration documents for the Firm and copies should be submitted along with the offer.	

Note: Vendor/bidder should conform all the above said points without which the offer will not be technically considered.

PART-B

Item No: 10 Supply of MV electrical installation material for power supply to Shop floors					
SI No.	ITEM TEXT	Unit	QTY	RATE	VALUE
1	Medium voltage, floor mounting type Cubicle type switch board (MP Board) comprising of fuse switches, bus bar chamber as per the specification in Annexure-I.	NO	17		
2	Medium voltage, floor mounting type Cubicle type switch board (ML Board) comprising of fuse switches, bus bar chamber as per the specification in Annexure-II.	NO	7		
3	Medium voltage, floor mounting type Cubicle type switch board (Crane MP Board) comprising of fuse switches, bus bar chamber as per the specification in Annexure-III.	NO	2		
4	8 ways 63 A MCB distribution Boards as per Annexure-IV	NO	45		
5	8 ways 32 A MCB distribution Boards as per Annexure-V	NO	45		
6	8 ways 16 A MCB distribution Boards as per Annexure-VI	NO	16		
7	400A MCCB -3 pole with adjustable thermal/magnetic overload release ,breaking capacity 36 KA suitable for 3phase 415 volts 50 HZ AC sytem conforming to IEC60947-2and ISI 3947(part2) . The make shall be Legrand,Siemens,L&T, GE,Schnieder,ABB	NO	4		
8	250A MCCB -3 pole with adjustable thermal/magnetic overload release ,breaking capacity 36 KA suitable for 3phase 415 volts 50 HZ AC sytem conforming to IEC60947-2and ISI 3947(part2) . The make shall be Legrand,Siemens,L&T, GE,Schnieder,ABB	NO	7		
9	3 Phase 415 volts TP/ TPN 200 amps isolator as per Annexure-VII	NO	40		
10	3 Phase 415 volts TP/ TPN 100 amps isolator as per Annexure-VII	NO	30		
11	3 Phase 415 volts TP/ TPN 63 amps isolator as per Annexure-VII	NO	250		
12	3 Phase 415 volts TP/ TPN 32 amps isolator as per Annexure-VII	NO	250		
13	32A Four Pole RCBO with 30mA residual current. Preferable makes: Havells/ GE/ Legrand/ Siemens/ L&T.	NO	120		
14	Surface mounting type 20A single pole ,3 pin metal clad plug and socket housed in a painted sheet steel MS box,earthing knob with one no 20 Amps, 10kA MCB Make : Legrand /Siemens /GE / Havells/ Standard / Schneider / ABB ,C&S	NO	90		
15	630 mm sweep column mounted, 3-phase man coolers (fans) along with the suitable 3 ph DOL starter as per Annexure-VIII.	NO	140		
16	Tubular man coolers (fans) 630 mm sweep with 3 ph DOL starter as per Annexure-VIII.	NO	70		
17	Pedestal mounted, 3-phase man coolers (fans) 630 mm sweep with suitable 3 ph DOL starter as per Annexure-VIII.	NO	40		

18	50x6 mm size Hot dipped GI flat .MS flat shall conform to IS2062 &Galvanisation shall conform to IS4759.The thickness of the ZINC coating shall be min 80 microns with test certificate	Kg	15000		
19	25x3mm size Hot dipped GI flat .MS flat shall conform to IS2062 &Galvanisation shall conform to IS4759.The thickness of the ZINC coating shall be min 80 microns with test certificate	Kg	4000		
20	8 SWG copper Wire for earthing of switch fuse / isolators/ plug points/ Glands etc.	Kg	500		
21	12 SWG copper Wire for earthing of switch fuse / isolators/ plug points.	Kg	700		
22	2mm thick Synthetic insulating mat as per IS: 15652-2006 as per Annexure-IX	M2	300		
23	15Litre Storage water heater PUF as per Annexure- X	NO	10		
24	Single Phase regulator controlled pedestrian fans as per Annexure-XI	NO	10		
25	Medium voltage 1100V Grade 3.5 core 185sqmm XLPE AA cable as per Annexure-XII.	Meter	20000		
26	Medium voltage 1100V Grade 3.5 core 50sq.mm XLPE AA cable as per Annexure-XII.	Meter	4000		
27	Medium voltage 1100V Grade 3.5 core 25sq.mm XLPE AA cable as per Annexure-XII.	Meter	4000		
28	Medium voltage 1100V Grade 4core 6 sqmm XLPE AA cable as per Annexure-XII.	Meter	4000		
29	Medium voltage 1100V Grade 4core 4sqmm XLPE AA cable as per Annexure-XII.	Meter	8000		
30	Medium voltage 1100V Grade 3.5 core 185sq.mm unarmoured copper cable as per Annexure-XIII.	Meter	500		
31	Medium voltage 1100V Grade 3.5 core 50sq.mm unarmoured copper cable as per Annexure-XIII.	Meter	500		
32	Heat Shrinkable Straight through joint Kit with copper ferrule suitable for 185 Sq.mm 3 1/2 Core 1.1 K.V Grade L.T. U.G XLPE AA CABLE. Cable Jointing kit should confirm to IS 13573-1982 and the offered joints should have been type tested by CPRI / ERDI. Preferable makes Raychem/3M.	NO	30		
33	Heat Shrinkable Straight through joint Kit with copper ferrule suitable for 50 Sq.mm 3.5 Core 1.1 K.V Grade L.T. U.G XLPE AA CABLE. Cable Jointing kit should confirm to IS 13573-1982 and the offered joints should have been type tested by CPRI / ERDI. Preferable makes Raychem/3M.	NO	30		
34	Heat Shrinkable Straight through joint Kit with copper ferrule suitable for 25 Sq.mm 3 1/2 Core 1.1 K.V Grade L.T. U.G XLPE AA CABLE. Cable Jointing kit should confirm to IS 13573-1982 and the offered joints should have been type tested by CPRI / ERDI. Preferable makes Raychem/3M.	NO	30		
TOTAL					

Item No: 20 Erection of electrical installation material in the Shop floor.					
SI No.	ITEM TEXT	Unit	QTY	RATE	VALUE
1	Erection, testing and commissioning of Medium voltage, floor mounting type Cubicle type switch board (MP Board) comprising of fuse switches, bus bar chamber with necessary civil works and grouting.	NO	17		
2	Erection, testing and commissioning of Medium voltage, floor mounting type Cubicle type switch board (ML Board) comprising of fuse switches, bus bar chamber with necessary civil works and grouting.	NO	7		
3	Erection, testing and commissioning of Medium voltage, floor mounting type Cubicle type switch board (MC Board) comprising of fuse switches, bus bar chamber with necessary civil works and grouting.	NO	2		
4	Assembly, fixing and testing of 8 ways 63 A MCB distribution Boards on the columns of the floor. Necessary cable adopter boxes for both incoming & outgoing, support channels with required fasteners are to be supplied by the contractor.	NO	45		
5	Assembly, fixing and testing of 8 ways 32 A MCB distribution Boards on the columns of shop floor. Necessary cable adopter boxes for both incoming & outgoing, support channels with required fasteners are to be supplied by the contractor.	NO	45		
6	Assembly, fixing and testing of 8 ways 16 A MCB distribution Boards on the columns of shop floor. Necessary cable adopter boxes for both incoming & outgoing, support channels with required fasteners are to be supplied by the contractor.	NO	16		
7	Fixing of 3 Phase 415 volts TP/ TPN 400 amps MCCB with supply of necessary Sheet steel weather proof enclosure for housing the MCCB, angle iron frame work, necessary cable adopter boxes for both incoming & outgoing sides on the shop floor/wall / column. (For Machines) Note:- 1. Sheet steel enclosure should be painted with two coats of red oxide paint and one coat of enamel paint and should be made neat and clean.	NO	4		
8	Fixing of 3 Phase 415 volts TP/ TPN 250 amps MCCB with supply of necessary Sheet steel weather proof enclosure for housing the MCCB, angle iron frame work, necessary cable adopter boxes for both incoming & outgoing sides on the shop floor/wall / column. (For Machines) Note:- 1. Sheet steel enclosure should be painted with two coats of red oxide paint and one coat of enamel paint and should be made neat and clean. 2. Lettering with paint over the enclosure of the housing to be done by the contractor as per the instruction of the Electrical incharge.	NO	7		

9	Fixing of 3 Phase 415 volts TP/ TPN 200 amps isolator/switch fuse with necessary angle iron frame work on the shop floor/wall /column. Necessary cable adopter boxes for both incoming & outgoing, support channels with required fasteners are to be supplied by the contractor. (For Machines)	NO	40		
10	Fixing of 3 Phase 415 volts TP/ TPN 100 amps isolator/switch fuse with necessary angle iron frame work on the shop floor/wall /column. Necessary cable adopter boxes for both incoming & outgoing, support channels with required fasteners are to be supplied by the contractor. (For Machines)	NO	30		
11	Fixing of 3 Phase 415 volts TP/ TPN 63 amps isolator/switch fuse with necessary angle iron frame work on the shop floor/wall / column. Necessary support channels with required fasteners are to be supplied by the contractor. (for m/c and welding m/c).	NO	250		
12	Fixing of 3 Phase 415 volts TP/ TPN 32 amps isolator/switch fuse along with necessary angle iron frame work on the shop floor/wall / column. Necessary support channels with required fasteners are to be supplied by the contractor. (For man coolers).	NO	250		
13	Fixing of 3 Phase 415 volts Four pole 32 amps RCBO in suitable sheet metal box/ industrial metal enclosure along with necessary angle iron frame work on the shop floor/wall / column. Necessary support channels with required fasteners are to be supplied by the contractor. (For man coolers).	NO	120		
14	Fixing of 20 Amps. Metal clad industrial type switched socket / on the top of sheet metal box/industrial metal enclosure on the column/wall with necessary iron framework with internal wiring and earth connection. Necessary support channels/angles with required fasteners for carrying out the work will be in the scope of the contractor.	NO	90		
15	Supply, installation and testing of Eco friendly Maintenance free (Chemical) earth pits in the shop floor. The specifications for the earth pit are mentioned in Annexure-XIV.	NO	20		
16	Assembly and fixing of 630 mm sweep column mounted, 3-phase man coolers (fans) along with the supply of suitable 3 ph DOL starter in the steel frame work on the column with suitable angle iron framework, necessary earth connection and connecting it to the available power supply.	NO	140		

17	Assembly and fixing of Tubular man coolers (fans) 630 mm sweep with 3 ph DOL starter on the steel frame, necessary support plates,required fastners, inter connections , earth connection and connecting it to the available power supply.	NO	70		
18	Assembly and Fixing of Pedestal mounted, 3-phase man coolers (fans) 630 mm sweep with suitable 3 ph DOL starter on the Pedestal tube mounted, on the steel frame.Necessary support plates,required fastners, inter connections,earth connection and connecting it to the available power supply.	NO	40		
19	Laying and fixing of 50x6mm G.I.flat for earthing of MP board, ML board, crane MP board, machine frames and in the cable trench by welding on the insert plate already opened / excavated trench or on the wall / switch board.	Kg	15000		
20	Laying and fixing of 25x3mm G.I.flat for earthing of DB, DL boards, 400A switch/ isolator ,200A switch/isolator,100A switch/isolator in already opened / excavated trench or on the wall /column /floor/ switch board.	Kg	4000		
21	Fixing of 50X6mm GI flat of 1mtr.length across the column and to be drilled with 16 nos. of 8mm dia. holes.	NO	300		
22	Laying and fixing of 8 SWG copper wire for earthing of switch fuse / isolators/ plug points in the already opened or excavated trench or on the wall / switch board.	Kg	500		
23	Laying and fixing of 12 SWG copper Wire for earthing of switch fuse / isolators/ plug points in the already opened or excavated trench or on the wall / switch board.	Kg	700		
24	Laying and pasting of 2mm thick Synthetic insulating mat in front of newly commissioned MP, ML, Crane boards, 63A DB and 32A DB. The insulating mat should be cut to the required lengths. Clean the surface of the floor by cleaning agent ,cut the required size of the synthetic insulating mat and apply PEDILITE make SR998 / 998FW resin and paste neatly on the floor in front of all MP, ML and Crane boards. Note:- All the materials required including qty. of cleaning agent, PEDILITE make SR998 / 998FW resin and other materials will be in the scope of the contractor.	M2	300		
25	Supply, Fabrication and fixing of cable racks on both sides of the newly formed cable trench at shopfloor.The cable racks has to be painted with two coats of red-oxide paint after welding. Drawing for fabrication of the above cable racks is enclosed.	Kg	4860		

26	Laying of Medium voltage 3.5 core 185sqmm XLPE AA cable in the already excavated / formed trench. After laying the cable, the cable trenches should be closed with concrete slabs/MS plate (available adjacent to the trench). (Cable laying details: 1.SS to MP,ML and MC Boards, 2. MP to 63 A MCBDB 3. MC to 250A MCCB).	Meter	20000		
27	Laying of Medium voltage 3.5 core 50sq.mm XLPE AA cable in the already excavated / formed trench. After laying the cable , the cable trenches should be closed with concrete slabs/MS plate (available adjacent to the trench) and make it neat & clean. (Cable laying from MP Board to 32 A MCB DB).	Meter	4000		
28	Laying of Medium voltage 3.5 core 25sq.mm XLPE AA cable in the already excavated/ formed trench. After laying the cable , the cable trenches should be closed with concrete slabs/MS plate (available adjacent to the trench) and make it neat & clean. (Cable laying details: 1. 63 A MCB DB to 63 A Isolators 2. MP to 16A MCB DBs).	Meter	4000		
29	Laying of Medium voltage 4core 6 sqmm XLPE AA cable in the already excavated / formed trench. After laying the cable , the cable trenches should be closed with concrete slabs/MS plate (available adjacent to the trench) and make it neat & clean. (Cable laying from 32 A MCB DB to 32A Isolators & 32A Isolator to RCBO Box)	Meter	4000		
30	Laying of Medium voltage 4core 4sqmm XLPE AA cable in the already excavated / formed trench. After laying the cable , the cable trenches should be closed with concrete slabs/MS plate (available adjacent to the trench) and make it neat & clean. (Cable laying details: 1. 32A Isolator to Man coolers 2. 16 A MCB DB to 3 pin industrial plug/socket)	Meter	8000		
31	Laying of Medium voltage 3.5 core 185sq.mm unarmoured copper cable in the already excavated / formed trench. After laying the cable, the cable trenches should be closed with concrete slabs/MS plate (available adjacent to the trench) and make it neat&clean.	Meter	500		
32	Laying of Medium voltage 3.5 core 50 sq.mm unarmoured copper cable in the already excavated / formed trench. After laying the cable, the cable trenches should be closed with concrete slabs/MS plate (available adjacent to the trench) and make it neat&clean.	Meter	500		

33	Making end termination of Medium voltage 3.5 core 185 sq.mm XLPE Aluminium Armoured/ unarmoured copper cable with suitable brass double compression cable glands, copper lugs, gland earthing, cable clamping etc.	NO	350		
34	Making end termination of Medium voltage 3.5 core 50 sq.mm XLPE AA / unarmoured copper cable with suitable brass double compression cable glands, copper lugs, gland earthing, cable clamping etc.	NO	150		
35	Making end termination of Medium voltage 3.5 core 25 sq.mm XLPE AA / unarmoured copper cable with suitable brass double compression cable glands, copper lugs, gland earthing, cable clamping etc.	NO	550		
36	Making end termination of Medium voltage 4 core 6 sq.mm XLPE AA cable with suitable brass double compression cable glands, copper lugs, gland earthing, cable clamping etc.	NO	800		
37	Making end termination of Medium voltage 4 core 4sq.mm XLPE AA cable with suitable brass double compression cable glands, copper lugs, gland earthing, cable clamping etc.	NO	700		
38	Making straight through joints for 1.1 KV, 3.5 core 185sq.mm XLPE AA cables with Suitable Heat shrinkable straight through joint kits, accessories & necessary earthing.	NO	30		
39	Making straight through joints for 1.1 KV, 3.5 core 50sq.mm XLPE AA cables with Suitable Heat shrinkable straight through joint kits, accessories & necessary earthing.	NO	30		
40	Making straight through joints for 1.1 KV, 3.5 core 25sq.mm XLPE AA cables with Suitable Heat shrinkable straight through joint kits, accessories & necessary earthing.	NO	30		
41	Preparation of equipments layout drawings /single line diagrams incorporating all the supplied and installed equipments in this order and obtain necessary approval as per IE rules 1956/ Electricity Act 2003 and Safety Regulation 2010. The safety certificate from the Central Electrical authority for energising the equipments has to be obtained. Scope includes submission of application, completion certificate, valid ESA licence and coordination with the inspection of officials of CEA or any other statutory requirements applicable for the approval of all substations and allied installations. The electrical works should be carried out confirming to MSEDCL rules and regulations.	SET	1		

42	<p><u>Special Instructions:</u></p> <ol style="list-style-type: none"> 1. The contractor should supply necessary civil materials for grouting, floor concreting etc. 2. Cable tags should be provided for all power and control cables. 3. Letter painting work in all breakers, MP Boards, Distribution boards, MV Panels mentioning the cable size, bus bar arrangement identification of the breaker etc should be done by the contractor as per the instruction of Electrical in charge to meet the CEA/MSEDCL regulations.. 4. Electric Power for welding and other erection purpose are in contractor scope. 5. Welding m/c,gas cutting set and regulator should be brought by the contractor. 6. Any clarification & modification of the work should be directly discussed with the Electrical In charge. 7. Minor paint touching shall be done in the panel, MP, MI and MC Panels to cover damages caused during transport at contractor's scope. 8. Contractor should engage only Valid A-Grade License holders for the electrical works. <ol style="list-style-type: none"> 9.The contractor should get proper clearance from the security personnel while taking their supply materials inside and outside the site.They should maintain an invoice register,which is liable for inspection by the Electrical Incharge. 10.All Mps, MLs and distribution boards should be cleraly indicated with the name source of supply and cable sizes. 11. Danger sticker of suitable size as per regulation should be provided consisting of minimum three languages (Marathi, Hindi & English) as per electrical in-charge istration. 12. For performing the end terminations, required Lugs, Crimping tools and other materials for carrying out the work will be in the scope of the contractor. <ol style="list-style-type: none"> 13. Drawing approval should be obtained for the MP, ML and MC Panels before manufacturing the Panels. 14. Pre-dispatch inspection should be arranged for all the items at the manufacturer works. 15. For the erection of the items, quantity on Pro-Rata basis to be considered. 	Set	1		
		TOTAL			
	<p>Note: Incase of any quantity over & above the tolerance limit (of +10%) during the commissioning period (not exceeding 6 months), the vendor may confirm their willingness to supply the same & erect at the original rate mentioned in the offer.</p>	Vendor to confirm			

ANNEXURE-I

Specification for the Cubicle Type Power Switchboard (PCC)-Power

Sl. No	Description/Specifications	Vendor to confirm	Deviations
	Design, manufacture and supply of Medium Voltage, floor mounting, free standing, indoor, cubicle type switchboard comprising Switch fuse units conforming to the specification and features given below.		
1.0	Swich fuse unit Make: L&T/ GE/ Siemens/ ABB/ Schneider		
2.0	Incoming switch: Medium voltage 800 amps Triple Pole & Neutral (TPN) swtch fuse unit as per IEC 60947-3/IS:13947(part3) with HRC fuses Quantity: 1 no		
3.0	Outgoing Switches a)400Amps TPN switch fuse units with HRC fuses -1nos b)200Amps TPN switch fuse units with HRC fuses -6nos c) 100Amps TPN switch fuse units with HRC fuses -6nos		
4.0	Busbars: 800 A , TPN aluminium busbars.(cross sectional size of busbars - 2 runs 40x10mm each for Phase and 40x10mm for Neutral)		
5.0	Incomer &outgoing switch fuse units Specification:		
5.1	Swich fuse type: Panel mounting type Front operated, with Quad make&break mechanism		
5.2	Required Phase barriers should be provided for the fuse units with enough space for maintenance &replacement of contacts		
5.3	Positive isolation of fuses & separate arching & current carrying zone		
5.4	operating handle coupling arrangement confirming to IS - 8623		
6.0	Specification of Meters incomer unit		
6.1	CT Rating: 800/5A		
6.2	CT make shall be KayCee/Indcoil/Precise		
6.4	Voltmeter with selector switch(make AE/Rishab): Analog type, 0-500V, 96mm square, accuracy class 1.0		
6.5	Digital Multifunction meter (3-phase, 4 wire, 5A, class 1.0.) for indicating the parameters like current, frequency, power factor, power,Energy, % THD, RS 485 communication, etc. Digital meter shall be ENERCON/Selec/L&T/Secure/Elmeasure		
6.6	3 phase Indication lamps: LED type		
6.7	Cable entry: Aluminium, XLPE, armoured cables, bottom entry.		
6.8	Overall dimensions of the Panel		

6.9	Make of the accessories used in the panel, make & type no of switch fuse unit , technical leaflet of the switch fuse unit to be furnished in the offer.		
7.0	General Features:		
7.1	The panel shall be of modular construction with IP 55 protection . Incomer and the outgoing switch fuse units with metering panel should be constructed using 2 mm thick CRCA sheet steel with neoprene gasgets for the doors . The PCC panel should be painted with 2 coats of red oxide primery and one coat of powder coating finish paint Siemens grey color after undergoing degreasing,de rusting &phospating process . The PCC should have sufficient clearence in the panel for cable termination.Suitable gland plates should be made in the bottom of the panel and the bus bar chamber shall be front opening type to terminate the outgoing cables. Suitable IBMC channel at the bottom of the panel should be made .		
7.2	Busbars shall be made of high conductivity aluminium alloy with adequate cross section to operate at low operating temperatures. Busbars including neutral and earth bars shall be short circuit tested as per IS:8623 for a fault withstand level of 50KA for one second.The panel builder should have approved by CPRI/ERDA/ERTL for the panel being tested for the type test and the test certificate should be enclosed with offer		
7.3	The neutral busbars shall have a continuous current rating of 50% of the phase busbars. All busbars shall be insulated, colour coded for easy identification of individual phases and neutral.		
7.4	The earth busbar of size 50x6mm Alu bus bar shall run through out the length of the switchboard and be terminated at the two ends with cable eyes.		
7.5	High tensile bolts and spring washers shall be provided on all busbars and connection joints.		
7.6	All sheet steel work used in the panel shall undergo a rigorous metal treatment process involving alkaline degreasing, descaling in dilute sulphuric acid, phospating and painting.		
7.7	The panel shall have cable chamber housing the cable end connections and power/ control cable terminations. Adequate safety shall be provided for working in one vertical section without accidental contact with the live parts in an adjacent section.		
7.8	Adequate number of cable riser supports shall be provided to withstand rated short circuit current.		

7.9	Front and rear doors shall be fitted with dust excluded neoprene gaskets.		
7.9.1	All control wiring in the panel shall be carried out with 1100V single core PVC FRLS cable having stranded copper conductors of min. 1.5 sq.mm section for potential circuits and 2.5 sq.mm section for current transformer circuit. Wires shall be identified with number ferrules at either end.		
7.9.2	Removable gland plates shall be provided at the bottom of panel for cable termination.		
7.9.3	The PCC panel shall be suitable and should be able to carry the rated current for an ambient temperature of not less than 45 degree C without any derating and suitable for working in indian conditions.		
7.9.4	The construction of the panel shall generally conform to the Indian Electricity Rules. ON /OFF indication markings w.r.t to operation handle/knob to ne indicated in the switch front plate. Required DANGER caution board stickers should be provided in the front and rear panel		

ANNEXURE-II

Specification for the Cubicle Type Power Switchboard (PCC)-Lighting

Sl.No.	Description/Specifications	Vendor to confirm	Deviations
	Design, manufacture and supply of Medium Voltage, floor mounting, free standing, indoor, cubicle type switchboard comprising Switch fuse units conforming to the specification and features given below.		
1.0	Switch fuse unit Make:L&T/ GE/ Siemens / ABB/ Schneider		
2.0	Incoming switch: Medium voltage 800 amps Triple Pole & Neutral (TPN) switch fuse unit as per IEC 60947-3/IS:13947(part3) with HRC fuses Quantity: 1 no		
3.0	Outgoing Switches a)200A TPN switch fuse units with HRC fuses -2nos b)100A TPN switch fuse units with HRC fuses -8nos.		
4.0	Busbars: 800 A , TPN aluminium busbars.(cross sectional size of busbars - 2 runs 40x10mm each for Phase and 40x10mm for Neutral)		
5.0	Incomer &outgoing switch fuse units Specification:		
5.1	Switch fuse type: Panel mounting type Front operated, with Quad make&break mechanism		
5.2	Required Phase barriers should be provided for the fuse units with enough space formaintenance &replacement of contacts		
5.3	Positive isolation of fuses &separate arching¤t carrying zone		
5.4	operating handle coupling arrangement confirming to IS -8623		
6.0	Specification of Meters incomer unit		
6.1	C.T. make shall be KayCee/Indcoil/Precise		
6.2	Voltmeter with selector switch(makeAE/Rishab): Analog type, 0-500V, 96mm square, accuracy class 1.0		
6.3	Digital Multifunction meter(3-phase, 4 wire, 5A, class 1.0.) for indicating the parameters like current, frequency, power factor, power,Energy, % THD, RS 485 communication, etc digital meter shall be ENERCON/Selec/L&T/Secure/Elmeasure make		
6.4	3 phase Indication lamps: LED type		
6.50	Cable entry: Aluminium, XLPE, armoured cables, bottom entry.		
6.6	Overall dimensions of the Panel		

6.7	Make of the accessories used in the panel, make & type no of switch fuse unit , technical leaflet of the switch fuse unit to be furnished in the offer.		
7.0	General Features:		
7.1	The panel shall be of modular construction with IP 55 protection . Incomer and the outgoing switch fuse units with metering panel should be constructed using 2 mm thick CRCA sheet steel with neoprene gasgets for the doors . The PCC panel should be painted with 2 coats of red oxide primery and one coat of powder coating finish paint Siemens grey color after undergoing degreasing,de rusting &phospating process . The PCC should have sufficient clearence in the panel for cable termination.Suitable gland plates should be made in the bottom of the panel and the bus bar chamber shall be front opening type to terminate the outgoings cables. Suitable IBMC channel at the bottom of the panel should be made .		
7.2	Busbars shall be made of high conductivity aluminium alloy with adequate cross section to operate at low operating temperatures. Busbars including neutral and earth bars shall be short circuit tested as per IS:8623 for a fault withstand level of 50KA for one second.The panel builder should have approved by CPRI/ERDA/ERTL for the panel being tested for the type test and the test certificate should be enclosed with offer		
7.3	The neutral busbars shall have a continuous current rating of 50% of the phase busbars. All busbars shall be insulated, colour coded for easy identification of individual phases and neutral.		
7.4	The earth busbar of size 50x6mm GI shall run through out the length of the switchboard and be terminated at the two ends with cable eyes.		
7.5	High tensile bolts and spring washers shall be provided on all busbars and connection joints.		
7.6	All sheet steel work used in the panel shall undergo a rigorous metal treatment process involving alkaline degreasing, descaling in dilute sulphuric acid, phospating and painting.		
7.7	The panel shall have cable chamber housing the cable end connections and power/ control cable terminations. Adequate safety shall be provided for working in one vertical section without accidental contact with the live parts in an adjacent section.		

7.8	Adequate number of cable riser supports shall be provided to withstand rated short circuit current.		
7.9	Front and rear doors shall be fitted with dust excluded neoprene gaskets.		
7.9.1	All control wiring in the panel shall be carried out with 1100V single core PVC cable having stranded copper conductors of min. 1.5 sq.mm section for potential circuits and 2.5 sq.mm section for current transformer circuit. Wires shall be identified with number ferrules at either end.		
7.9.2	Removable gland plates shall be provided at the bottom of panel for cable termination.		
7.9.3	The PCC panel shall be suitable and should be able to carry the rated current for an ambient temperature of not less than 45 degree C without any derating and suitable for working in indian conditions.		
7.9.4	The construction of the panel shall generally conform to the Indian Electricity Rules.ON /OFF indication markings w.r to operation handle/knob to be indicated in the switch front plate.Required DANGER caution board stickers should be provided in the front and rear panel		

ANNEXURE-III

Specification for the Cubicle Type Power Switchboard (PCC)-Crane DSL

Sl.No.	Description/Specifications	Vendor to confirm	Deviations
	Design, manufacture and supply of Medium Voltage, floor mounting, free standing, indoor, cubicle type switchboard comprising Switch fuse units conforming to the specification and features given below.		
1.0	Swich fuse unit Make: L&T/ GE/ Siemens /ABB/Schneider		
2.0	Incoming switch: Medium voltage 800 amps Triple Pole & Neutral (TPN) swtch fuse unit as per IEC 60947-3/IS:13947(part3) with HRC fuses Quantity: 1 no		
3.0	Outgoing Switches a)400Amps TPN switch fuse units with HRC fuses -6nos		
4.0	Busbars: 800 A , TPN aluminium busbars.(cross sectional size of busbars - 2 runs 40x10mm each for Phase and 40x10mm for Neutral)		
5.0	Incomer & outgoing switch fuse units Specification:		
5.1	Swich fuse type: Panel mounting type Front operated, with Quad make&break mechanism		
5.2	Required Phase barriers should be provided for the fuse units with enough space formaintenance &replacement of contacts		
5.3	Positive isolation of fuses &separate arching¤t carrying zone		
5.4	operating handle coupling arrangement confirming to IS -8623		
6.0	Specification of Meters incomer unit		
6.1	C.T. make shall be KayCee/Indcoil/Precise		
6.2	Voltmeter with selector switch(makeAE/Rishab): Analog type, 0-500V, 96mm square, accuracy class 1.0		
6.3	Digital Multifunction meter (3-phase, 4 wire, 5A, class 1.0) for indicating the parameters like current, frequency, power factor, power,Energy, % THD, RS 485 communication, etc Digital meter shall be ENERCON/Selec/L&T/Secure/Elmeasure		
6.4	3 phase Indication lamp: LED Type		
6.5	Cable entry: Aluminium, XLPE, armoured cables, bottom entry.		
6.6	Overall dimensions of the Panel		
6.7	Make of the accessories used in the panel, make & type no of switch fuse unit , technical leaflet of the switch fuse unit to be furnished in the offer.		
7.0	General Features:		

7.1	The panel shall be of modular construction with IP 55 protection . Incomer and the outgoing switch fuse units with metering panel should be constructed using 2 mm thick CRCA sheet steel with neoprene gasgets for the doors . The PCC panel should be painted with 2 coats of red oxide primery and one coat of powder coating finish paint Siemens grey color after undergoing degreasing,de rusting &phospating process . The PCC should have sufficient clearence in the panel for cable termination.Suitable gland plates should be made in the bottom of the panel and the bus bar chamber shall be front opening type to terminate the outgoing cables. Suitable IBMC channel at the bottom of the panel should be made .		
7.2	Busbars shall be made of high conductivity aluminium alloy with adequate cross section to operate at low operating temperatures. Busbars including neutral and earth bars shall be short circuit tested as per IS:8623 for a fault withstand level of 50KA for one second.The panel builder should have approved by CPRI/ERDA/ERTL for the panel being tested for the type test and the test certificate should be enclosed with offer		
7.3	The neutral busbars shall have a continuous current rating of 50% of the phase busbars. All busbars shall be insulated, colour coded for easy identification of individual phases and neutral.		
7.4	The earth busbar of size 50x6mm Alu bus bar shall run through out the length of the switchboard and be terminated at the two ends with cable eyes.		
7.5	High tensile bolts and spring washers shall be provided on all busbars and connection joints.		
7.6	All sheet steel work used in the panel shall undergo a rigorous metal treatment process involving alkaline degreasing, descaling in dilute sulphuric acid, phospating and painting.		
7.7	The panel shall have cable chamber housing the cable end connections and power/ control cable terminations. Adequate safety shall be provided for working in one vertical section without accidental contact with the live parts in an adjacent section.		
7.8	Adequate number of cable riser supports shall be provided to withstand rated short circuit current.		
7.9	Front and rear doors shall be fitted with dust excluded neoprene gaskets.		
7.9.1	All control wiring in the panel shall be carried out with 1100V single core PVC cable having stranded copper conductors of min. 1.5 sq.mm section for potential circuits and 2.5 sq.mm section for current transformer circuit. Wires shall be identified with number ferrules at either end.		
7.9.2	Removable gland plates shall be provided at the bottom of panel for cable termination.		

7.9.3	The PCC panel shall be suitable and should be able to carry the rated current for an ambient temperature of not less than 45 degree C without any derating and suitable for working in indian conditions.		
7.9.4	The construction of the panel shall generally conform to the Indian Electricity Rules.ON /OFF indication markings w.r to operation handle/knob to be indicated in the switch front plate.Required DANGER caution board stickers should be provided in the front and rear panel		

ANNEXURE-IV

Specification for 63A MCB Distribution Board

Sl.No.	Description/Specifications	Vendor to confirm	Deviations
	Supply of Medium Voltage, 8 Way MCB distribution boards with 63A three pole per way as outgoing and 250A, 4 pole MCCB as incomer. The distribution boards conforming to the specification and features given below.		
1.0	MCB Distribution Board		
1.1	Type of enclosure confirming to IP42: Fabricated Sheet steel.		
1.2	Configuration: Three poles and neutral DB		
1.3	Number of ways: 8 ways		
1.4	Copper Busbar Rating: 250 A		
1.5	Make of the MCB distribution Board (Siemens/ L&T/ Hager/ ABB/ Legrand make only acceptable)		
1.6	Overall dimensions of the DB		
2.0	Miniature Circuit Breaker/MCCB		
2.1	Breaking Capacity as per IS 8828 of 1996, IEC 608898 of 1995 for MCB and IEC 60947-2 for MCCB: 10 KA for MCB & 36 KA for MCCB		
2.2	Type of release: Fixed thermo magnetic for MCB. Adjustable thermo magnetic for MCCB.		
2.3	Current rating at 415V, 50Hz: 63 A/250 A (as specified for outgoing/incomer)		
2.4	Number of MCB: 63A, 8 nos., Three pole MCB as outgoing, 250A, 1 no. 4 pole MCCB as incomer.		
2.5	Mounting accessories for MCCB :- Spreader links Suitable current rating and size . Vendor to confirm.		
2.6	Terminal capacity of MCB: Proper termination and firm connection to accommodate 25sq.mm cable.		
2.7	Make, Type of the MCB offered should be Schneider, Legrand, Standard Kopp, Havells, Hager, Siemens, ABB , C&S are only acceptable.		
3.0	General Features of the Lighting Distribution board:		
3.1	The DBs shall be 250A Copper Busbar with neutral bars, earth bars and Cable Ties for cable management, interconnecting wires/links. Neutral bars and busbars should be fully insulated with door earthing with IP 42 protection.		
3.2	DB shall be provided with gland plates at the top and bottom with knockouts.		

3.3	Earth bar for facilitating individual earth for each outgoing circuit with necessary bolts, nuts, etc.		
3.4	Label to be permanently and securely fixed inside the case to mark the name, current rating of the circuit.		
3.5	Gaskets shall be provided to ensure vermin proof condition.		
3.6	The DB shall be provided with metal double door.		
3.7	The DB shall be epoxy powder coated to give a superior finish with great aesthetics look.		
3.8	The DB should conform to IS:13032-1991 and Indian Electricity Rules.		
3.8	The MCB shall conform to IS:8828-1996 & IEC 608898 of 1995 and IEC 60947-2 for MCCB.		

ANNEXURE-V

Specification for 32A MCB Distribution Board

Sl.No.	Description/Specifications	Vendor to confirm	Deviations
	Manufacture and supply of Medium Voltage, 8 Way MCB distribution boards with 32A, three pole MCB per way as outgoing, 125A 4 pole MCCB as incomer, Metallic Double door. The DB should be suitable for flush / surface mounting. The distribution boards conforming to the specification and features given below.		
1.0	MCB Distribution Board		
1.1	Type of enclosure confirming to IP42: Fabricated Sheet steel. Vendor to confirm.		
1.2	Configuration: Three poles and neutral		
1.3	Number of ways: 8 Ways		
1.4	Copper Busbar Rating: 125 A		
1.5	Make of the MCB distribution Board (Siemens/ L&T/ Hager/ ABB/ Legrand make only acceptable)		
1.6	Overall dimensions of the DB: (Vendor to specify)		
2.0	Miniature Circuit Breaker/MCCB		
2.1	Breaking Capacity as per IS 8828 of 1996, IEC 60889 of 1995 for MCB and IEC 60947-2 for MCCB. (10 KA for MCB & 16 KA for MCCB)		
2.2	Type of release: Fixed thermo magnetic for MCB. Adjustable thermo magnetic for MCCB.		
2.3	Current rating at 415V, 50Hz: 125A, 4 pole MCCB as incomer. 32A, Three pole MCB as outgoing.		
2.4	Number of MCB: 32A, 8 nos. Three pole MCB. 125A, 1 no. 4 pole, MCCB.		
2.5	Mounting accessories for MCCB :- Spreader links: Suitable current rating and size .		
2.6	Terminal capacity of MCB: Proper termination and firm connection to accommodate 35sq.mm cable.		
2.7	Make, Type of the MCB offered should be Schneider, Legrand, Standard Kopp, Havells, Hager, Siemens, ABB, C&S are only acceptable.		
3.0	General Features of the Lighting Distribution board:		

3.1	The DBs shall be 125A Copper Busbar with neutral bars, earth bars and Cable Ties for cable management, interconnecting wires/links. Neutral bars and busbars should be fully insulated with door earthing with IP 42 protection.		
3.2	DB shall be provided with gland plates at the top and bottom with knockouts.		
3.3	Earth bar for facilitating individual earth for each outgoing circuit with necessary bolts, nuts, etc.		
3.4	Label to be permanently and securely fixed inside the case to mark the name, current rating of the circuit.		
3.5	Gaskets shall be provided to ensure vermin proof condition.		
3.6	The DB shall be provided with metal double door.		
3.7	The DB shall be epoxy powder coated to give a superior finish with great aesthetics look.		
3.8	The DB should conform to IS:13032-1991 and Indian Electricity Rules.		
3.9	The MCB shall conform to IS:8828-1996 and ,IEC 608898 of 1995 and IEC 61009-1-1996 for MCCB.		

ANNEXURE-VI
Specification for 16A MCB Distribution Board

Sl.No.	Description/Specifications	Vendor to confirm	Deviations
	Supply of Medium Voltage, 8 Way MCB distribution boards with 16A, single pole MCB per way as outgoing, 3 nos. 63A DP MCB as phase controller, 100A, 4 pole MCB incomer, Metallic Double door. The DB should be Phase Segregated and Separated between incomer and outgoing, suitable for flush / surface mounting. The distribution boards conforming to the specification and features given below.		
1.0	MCB Distribution Board		
1.1	Current rating: 100A, 4 pole MCB for main incomer. 63A, 2 pole MCB in each phase for phase isolation. 16A, 1 pole MCB for each outgoing way.		
1.2	Configuration: Three poles and neutral DB with per phase isolation		
1.3	Type of enclosure: Fabricated Sheet steel		
1.4	Number of ways per phase: 8 ways		
1.5	Busbar Rating: 100 A		
1.6	Make of the MCB distribution Board (Siemens/ L&T/ Hager/ ABB/ Legrand make only acceptable)		
2.0	Miniature Circuit Breaker		
2.1	Current rating: 16 A/100 A (as specified for outgoing/incomer)		
2.2	Number of MCB: 24 nos. 16A, 1P, MCB 3 nos. 63A, 2P, MCB 1 no. 100A, 4P. MCB		
2.3	Breaking capacity of the MCB: 10KA		
3.0	General Features of the Lighting Distribution board:		
3.1	The DBs shall be ready to use with neutral links, earth links, Busbar and interconnecting wires/links.		
3.2	DB shall be provided with gland plates at the top and bottom with knockouts.		
3.3	Earth bar for facilitating individual earth for each outgoing circuit with necessary bolts, nuts, etc.		
3.4	Label to be permanently and securely fixed inside the case to mark the name, current rating of the circuit.		
3.5	Gaskets shall be provided to ensure vermin proof condition.		
3.6	The DB shall be provided with single door.		
3.7	The DB shall be painted with one coat of red oxide primer and two coats of enamel paint.		
3.8	The DB should conform to IS:13032-1991 and Indian Electricity Rules.		
3.9	The MCB shall conform to IS:8828-1996		

ANNEXURE-VII

Specification for Medium Voltage Switch Disconnecter Isolator

Sl.No.	Description/Specifications	Vendor to confirm	Deviations
	Supply of Medium Voltage Switch Disconnecter Isolator conforming to the specification and features given below.		
1.0	Switch Disconnecter Isolator:		
1.1	Current rating at 415V, 50Hz: 32A/ 63A/ 100A/ 200A as specified in the scope of supply		
1.2	Configuration: Three poles and neutral		
1.3	Type of enclosure: Sheet steel		
1.4	Voltage rating: 415V, 50Hz, a.c		
1.4	Overall dimensions of the isolator:		
1.5	Make of the isolator switch(L&T,Siemens,GE,Havells,GEM)		
1.6	Type no. of the isolator switch offered		
1.7	Technical leaflet of the isolator switch offered to be enclosed with the offer.		
2.0	General Features of the Switch Disconnecter isolator:		
2.1	The switches shall be totally enclosed and fully shrouded		
2.2	Provided with On/Off flag indication and two earthing terminals		
2.3	Quick make, quick break mechanism, independent of the speed of the operator.		
2.4	All current carrying parts shall be hard silver plated.		
2.5	Units to be provided with bolted type neutral links with facility to disconnect neutral easily.		
2.6	Interlock to ensure the lid cannot be opened until the switch is in off position and the possibility to defeat the interlock by a competent examiner.		
2.7	Provided with phase-phase, phase-earth insulating barrier		
2.8	Generous space for wiring, inspection and maintenance		
2.9	Conduit knock-outs at top and bottom or removable gland plates		
2.9.1	These Isolators should have side operating handles.		

ANNEXURE-VIII

Specifications for Column mounted / Tubular / Pedestal Type Mancooler

Sl.No.	Description/Specifications	Vendor to confirm	Deviations
	General purpose Bracket type (Column mount) / Tubular Type/ Pedestal Type 610 mm sweep mancooler meant for industrial application and suitable for operation on 3phase, 415V, 50Hz a.c.supply.		
1.0	Mancooler Construction		
1.1	Tubular Type Mancooler Construction: Fan mounted on a tubular, mild steel support cradle.Casing to be of mild steel, with inlet and outlet coned to improve airflow.Motor mounted on a platform inside the casing.Swivel in the vertical plane with locking arrangement.Whole unit to be robustly built to stand firmly and withstand rough handling.		
1.2	Bracket (Column Mount) Type Mancooler Construction: Fan with a tubular mount and mounting plate suitable for installation on column. Motor mounted on a platform. Swivel facility in horizontal plane with self locking arrangement.		
1.3	Pedestal Type Mancooler Construction: Fan with a tubular pedestal mounting type. The tubular pipe dia min 80mm base plate dia min 600mm shall be robust to to ensure Fan stability. The height shall be approx. 1100mm. Motor mounted on a platform.		
2.0	Impeller: 610 mm sweep aerofoil axial impeller of die cast aluminum alloy for high efficiency and long throw. Blades to be dynamically and statically balanced. Impeller to be directly coupled to the motor.		
2.1	Number of blades in the impeller: 5		
2.2	Safety Guard: Air inlet and outlet to be provided with safety guards and suitable wire mesh to preven the approach while the fan is running.		
3.0	Motor Specification: Foot mounted, squirrel cage, 4 Pole, induction motor suitable for 415, 3-phase, 50Hz a.c. supply.		
3.1	Motor Power: Not less than 0.5 HP		
3.2	Make of motor: Vendor to specify. (Only reputed makes)		
4.0	Make of the Mancooler: Bajaj, Almonard. Vendor to specify.		

5.2	Noise level at 1m distance in dbA: less than 85dB		
6.0	Dimensions: (Vendor to Specify)		
6.1	Robust metal Guard: Suitable closed mesh guard should be provided in two pieces with positive locking system vendor should confirm the same.		
6.2	Blade Clearances: adequate protection against personal injury having clearance of minimum 25mm between the guard periphery and the tips of blades should be made vendor should confirm the same		
6.1	Conformance to IS standard: Mancoolers - IS 6272 : 1987		

ANNEXURE-IX

Specification for Synthetic High Voltage Insulating Mats as per IS-15652:2006

Sl. No	Description/Specifications	Vendor to confirm	Deviations
	Supply of High Voltage Insulating Synthetic Mats,with High dielectric Strength, Fire Retardant. Insulation Resistance Up to 100,000 Mega Ohm with 5000V Megger. Good Mechanical Properties to With Stand Load and Movement of Breaker Trolleys and Associated Electrical Equipment. No Adverse Effect of Acids, Alkalis and Transformer Oil. Technical specification as given below:		
1.0	High Voltage Insulating Synthetic Mats		
1.1	Nominal Thickness of earthmat: 2.0mm		
1.2	Width: 1 meter		
1.3	Roll Length: Up to 20 meter		
1.4	Synthetic High Voltage Insulating Mats as per latest IS-15652:2006		
1.5	Di Electric Strength		
1.6	Conformance to Indian Standard specification: IS:15652 / 2006		
1.7	Tensile strength: 15 N/sqm & elongation: 250		
2.0	Technical leaflet of the insulating earth mats indicating the approx. diameter,length, weight, thickness of insulation, current rating etc. to be enclosed with the offer.		
3.0	General Features of the Insulating Synthetic Mats:		
3.1	Insulating Synthetic Mats shall have the manufacturer name embossed/ printed/ indented on the mats at regular intervals.		
3.2	ERDA/CPRI test shall be conducted as per IS on the insulating earth mats and test certificate shall be produced.		
4.0	Reference List/ Qualifying Conditions:		
4.1	Only those vendors who have supplied similar or higher rating of insulating earth mats should quote.		
4.2	Information about the customers to whom similar insulating earth mats have been supplied is to be submitted for qualification of the offer.		
5	Preferred Makes: A.M. Vinyl Pvt. Ltd., Premier Polyfilm Limited, RMG Polyvinyl INDIA Limited, Vardhman Hoses (P) Ltd., V.R. Enterprises.		

ANNEXURE-X
Specifications for the 15L Water Heater

Sl. No	Description/Specifications	Vendor to confirm	Deviations
1	Vertical mounting storage closed water heater. 15 liters capacity. 230/240 Volts, 50Hz, AC Supply. Pure (99.9%) Copper- Inner tank. Heating element: - Ceramic cartridge type. Outer container: - Mild Steel (powder coated) (or) stainless steel (or) PVC. Insulation: - Polyurethane foam-in split capsule form. Safety devices:- Thermostat cutout with semi return device, Pressure vacuum release valve & fusible plug, Working pressure:-Minimum 3kg/sq cm (50psl). Please specify your guarantee including heating element. Catalogue should be furnished along with offer.		
2	Preferreble makes: Venus/ Vijay/ Racold/ Bajaj		

ANNEXURE-XI

Specification for 600 mm sweep Single Phase Air Circulator

Sl. No	Description/Specifications	Vendor to confirm	Deviations
	General purpose Pedestal Type, 600 mm sweep, Air Circulator for industrial application and suitable for operation on 1-phase, 230 V, 50Hz a.c.supply		
1.0	Pedastel fan Construction		
1.1	Pedestal Type air circulator Construction: Heavy duty Oscillation, Bracket type air circulator, 600mm sweep with impeller, consisting of three blades, Epoxy powder coated, 90 degree oscillation, sturdy braze wire guards, Robust base for stability, with control gear / with regulator, conforming to IS2997 - 1964		
2.0	Impeller: 600 mm sweep aerofoil axial impeller of die cast aluminum alloy for high efficiency and long throw. Blades to be dynamically and statically balanced. Impeller to be directly coupled to the motor.		
2.1	Number of blades in the impeller: Three blades.		
2.2	Safety Guard: Air inlet and outlet to be provided with safety guards along with wire mesh to avoid personnel injuries.		
3.0	Motor Specification: Foot mounted, induction motor suitable for 230 V, 1-phase, 50Hz a.c. supply.		
3.1	Motor Power: Not less than 180 W. (Vendor to specify actual power)		
3.2	Make and model of the Air Circulator: Reputed make. Vendor to specify make and frame size.		
4.0	Preferable Make of the Air Circulator: EPC, ALMONARD, ORIENT, CALCUTTA, KHAITAN, CROMPTON-GREEVES		
5.0	Air Flow		
5.1	Air velocity at outlet		
5.2	Noise level at 1m distance in dbA		
6.0	Dimensions : Technical and Dimensional details with catalogue to be enclosed.		
6.1	Conformance to IS standard: (Vendor to specify)		

ANNEXURE-XII
Specification for Medium Voltage Power Cable

Sl. No	Description/Specifications	Vendor to confirm	Deviations
	Supply of Medium Voltage, XLPE insulated conductor, PVC inner & outersheathed insulation , armoured Power Cable conforming to the specification given below.		
1.0	Medium Voltage Power Cable:		
1.1	Nominal area of conductor: 4/ 6/ 25/ 50/ 185 sq.mm as specified in the scope of supply		
1.2	Number of cores: 3.5 core/ 4 core as specified in the scope of supply. Cores identified with different colours		
1.3	Conductor: Stranded, Circular/ shaped, Aluminium as specified in the scope of supply.		
1.4	Voltage rating: 1.1KV, 50Hz, a.c		
1.5	Conductor Insulation: Insulation material XLPE as per IS -7098, Part-I		
1.6	Innersheath: PVC innersheath- Type ST2 as per IS-5831 -Black colour		
1.7	Armouring: Galvanized steel wire/ strip armouring as per IS-3975 & IS-7098		
1.8	Outersheath: General purpose, PVC compound outersheath - Type ST2 as per IS-5831 -black colour		
1.9	Conformance to Indian Standard specification: IS:7098(Part 1)/IS-5831		
2.0	Vendor should attach the GTP of the cable along with the offer.		
2.1	Technical leaflet of the cable indicating the approx. diameter, weight, thickness of insulation/ sheathing/ armour wire, current rating etc. to be enclosed with the offer.		
3.0	General Features of the M.V.Cable:		
3.1	Cable shall have the manufacturer name embossed/ printed/ indented on the outer sheath at regular intervals.		
3.2	Cable shall have Voltage grade, cable size embossed on the outer sheath.		
3.3	Routine tests shall be conducted on the cables as per IS and test certificate shall be produced		
4	The cable offered should have been 'Type Tested' as per IS: 7098 part-I, in any one of the government approved laboratory like CPRI, ERDA. Copy of the 'Type Test Certificate' should be enclosed along with the offer for acceptance of the make of the cable offered.		

5.0	Preferable makes: RPG,KEI, Gloster, Universal, Mansfield, , APAR industries limited, Cable corporation of india ltd., Diamond power infrastructure ltd, Hindusthan vidyut products ltd., Havells india limited, kei industries ltd., Krishna electrical industries ltd., KEC International limited, Nicco corporation ltd., Paramount communications ltd., Polycab wires pvt. ltd., Ravin cables limited, Sriram cables pvt. ltd., Torrent cables ltd., Universal cables ltd.		
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ANNEXURE-XIII

Specification for Medium Voltage Power Cable (Copper)

Sl. No	Description/Specifications	Vendor to confirm	Deviations
	Supply of Medium Voltage,rubber insulated flexible, unarmoured Power Cable conforming to the specification given below.		
1.0	Medium Voltage Power Cable:		
1.1	Nominal area of conductor: 185/50 sq.mm as specified in the scope of supply		
1.2	Number of cores: 3.5 core as specified in the scope of supply with RYB core color identification		
1.3	Conductor: Stranded, Circularshaped, annealedcopper as specified in the scope of supply.		
1.4	Voltage rating: 1.1KV, 50Hz, a.c		
1.5	Dielectric Insulation: Rubber insulation Silicon/EPR		
1.6	Innersheath: CSP inner sheathed Nylon braided		
1.8	Outersheath: CSP outer sheathed		
1.9	Conformance to Indian Standard specification: IS-9968(Part-I)		
2.0	Vendor should attach the GTP of the cable along with the offer.		
2.1	Technical leaflet of the cable indicating the approx. diameter, weight, thickness of insulation/ sheathing/ current rating etc. to be enclosed with the offer.		
3.0	General Features of the M.V.Cable:		
3.1	Cable shall have the manufacturer name embossed/ printed/ indented on the outer sheath at regular intervals.		
3.2	Cable shall have Voltage grade, cable size embossed on the outer sheath.		
3.3	Routine tests shall be conducted on the cables as per IS and test certificate shall be produced		
3.4	Make of the cable. Reputed make acceptable to BHEL.		
4	The cable offered should have been 'Type Tested' as per relevant standards, in any one of the government approved laboratory like CPRI, ERDA. Copy of the 'Type Test Certificate' should be enclosed along with the offer for acceptance of the make of the cable offered.		
5	The various tests that would be conducted as part of Routine test and the laboratory facilities available in the manufacturing plant for conducting those tests should be		
6.0	Preferable makes: RPG,KEI, Gloster, Universal, Mansfield, , APAR industries limited, Cable corporation of india ltd., Diamond power infrastructure ltd, Hindusthan vidyut products ltd., Havells india limited, kei industries ltd., Krishna electrical industries ltd., KEC International limited, Nicco corporation ltd., Paramount communications ltd., Polycab wires pvt. ltd., Ravin cables limited, Sriram cables pvt. ltd., Torrent cables ltd., Universal cables ltd.		

ANNEXURE-XIV

Specification for Eco friendly Maintenance Free Earthing

Sl. No	Description/Specifications	Vendor to confirm	Deviations
1.0 Qualification Conditions:			
1.1	Only those vendors, who have Supplied and installed Eco friendly maintenance Free earthing in the past five years as on the date of opening of this tender.		
1.2	Along with Technical offer, the Vendor should submit performance certificate from minimum one customer for the satisfactory performance of the same, supplied to them in the customer's letter head.		
2.0 Technical Specifications			
1	<p>Scope: This specification of eco friendly and Maintenance Free Earth describes in detail the components to be used and the procedure for constructing the earth system. The main purpose of using this new technology is to maintain an acceptable earth resistance value over the years without any maintenance and without contaminating the Ground water resources.</p>		
2	<p>Earthing system: The Earthing system includes supply of earth electrode and other components, installation of earth electrode in suitable pit size, construction of earth pit with cover.</p>		
3	<p>Components: The Maintenance Free Earth system shall consist of A. Earth electrodes B. Highly conductive and eco friendly backfill compound, C. Earth termination clamps to facilitate connections to the equipment. D. Inspection chamber & masonry Work. E. Measurement & Prove out.</p>		
3.1	<p>Earth Electrode: The Earth electrode should have good electrical conductivity and should not corrode in a wide range of soil conditions. For an effective earthing system the earth electrode shall confirm to the following specifications:</p>		
3.1.a	The electrode shall be a solid steel rod made of high tensile low carbon steel and coated with molecularly bonded copper on the outside as per UL 467 / BS 4360 Grade 43 A or EN10025:2-004 S275JR		
3.1.b	The thickness of the copper coating shall be atleast 250 microns.		
3.1.c	The electrode diameter shall be atleast 17 mm.		
3.1.d	The earth electrode shall carry manufacturer's name		

3.1.e	The length of the electrode shall be minimum 3 mtrs. Length of the electrode may be increased in multiple of 1 meter to reduce earth resistance if required. To increase the length, pieces of similar rod shall be either exothermally welded to basic 3 meter electrode or connected using socket of suitable size.		
3.2	<p>Highly conductive and Eco friendly backfill material :</p> <p>The backfill material shall be highly conductive and should be certified as non-polluting and non-hazardous by one of the Accredited / Recolonized National /International Laboratories. The backfill Material shall be carbon based and of low resistance, non-corrosive, highly conductive carbon based powdered material that improves grounding effectiveness, especially in areas of high soil resistivity such as rocky and sandy areas. This material shall be suitable to be installed in either slurry or dry form. The backfill material shall confirm to the following specifications:</p> <p>a.Shall be highly electrically conductive and non-soluble. b.Shall not leach into ground. c.Shall have a resistivity of less than 0.1 ohm meter as per clause 14.5 (d) of IEEE 80 d.Shall be compatible with all copper grounding systems e.Shall contain a corrosion inhibitor to mitigate corrosion of copper f.Shall not contain hazardous chemicals and bentonite g.Shall be certified to ANSI / NSF standard 60 as safe for use near potable ground water resources h.Shall not be affected by drought and shall be stable between - 10° to +50° C temperature. i.Shall not depend on continuous presence of moisture for conductivity. j.Shall be suitable for any kind of soil suitable quantity of this backfill compound shall be used per earth pit.</p>		
3.3	<p>Earth termination clamp:</p> <p>The earth termination clamp shall be made of GI and shall be suitable for terminating 50 x 6 mm GI flat strips or 35 Sq.mm un-armored Cu. Cable. Care should be taken to tighten all bolts and nuts to ensure a proper connection.</p>		
3.4	<p>Installation of Earth system:</p> <p>a. The earth electrode shall be installed in a bore of suitable dimension made by auguring the required depth to meet out the earth resistance value. It is in the scope of vendor to bore in case of concrete floor inside the shop floor. b. Wherever auguring is not feasible, pit shall be made and suitable size of PVC pipe shall be used to fix the electrode. c. At the center of the hole the electrode shall be driven and around the electrode the highly conductive and eco-friendly backfill material shall be filled. d. The highly conductive and eco-friendly backfill material can be poured in either dry or slurry form.</p>		

	<p>e. The PVC pipe shall be removed simultaneously as the backfill compound is poured.</p> <p>f. If watering of Earth pit is required for curing, the same has to be done by Vendor. Water will be supplied by BHEL at nearby Point at free of Cost.</p>		
3.5	<p>Inspection chamber</p> <p>a. A 600X600X600 mm (inside dimension) concrete box (wall thickness min. 50 mm) with smooth cement plaster finish shall be provided on the top of the pit. A concrete lid 25 to 50 mm. thick, with pulling hooks, painted black shall be provided to cover the earth pit. PVC sleeve of appropriate size shall be provided in concrete wall to take out earthing connections.</p> <p>b. On the total height of the concrete inspection chamber, at least 250mm shall be provided below ground level. Necessary sand cushioning shall be done.</p> <p>c. The masonry work shall be white washed inside and outside.</p> <p>d. Care shall be taken regarding level of the floor surrounding the earth so that the connector is not too deep in the masonry or projecting out of it.</p> <p>e. On backside of the cover, date of the testing and average resistance value shall be written with yellow paint on black background.</p>		
3.6	<p>Measurement of earth electrode resistance</p> <p>The earth resistance shall be measured using fall of potential method as per para 37 of IS:3043.</p>		
4	<p>Certificates:</p> <p>The following certificates are to be provided before the commencement of work</p> <p>a. Certificate for backfill as per clause 3.2</p> <p>b. Valid calibration certificate from NABL accredited labs for the testing equipment used for earth pit measurement.</p>		
5	<p>Vendor Scope:</p> <p>a. Vendor should bring their own equipment for installation and commissioning of earth pit.</p> <p>b. Vendor should bring their own testing equipment for earth pit measurement.</p>		
6	<p>Warranty :</p> <p>The warranty of installed Earth pit shall be 24 months from the date of acceptance.</p>		

ANNEXURE-XV

Suggestive Format of Performance Certificate:

The Performance certificate should contain minimum of the below said data and it shall be produced on **Customer's Letter Head** and submitted along with the offer.

1.0	Equipment/ Project Supplied to (Customer Details)	
2.0	Project Name	
3.0	Details of Equipment/ installation supplied	
3.1	Cubicle panels with SFUs: Busbar rating/SFU Make	
3.2	MV Cables: Size/ Make	
4.0	Purchase Order/ Work order Number	
5.0	Scheduled date of completion	
6.0	Actual date of completion	
7.0	Reasons for delay (if any)	
8.0	Performance of the contractor during erection & commissioning on turnkey basis	
Date:		Signature & Seal of the Authority Issuing the Performance Certificate