दूरभाष : +91 (22) 2559 4740
फैक्स : +91 (22) 2550 5151
Email: srikanta@barc.gov.in
chavanss@barc.gov.in

Desalination Division, B.A.R.C
ट्राम्बे, मुम्बई- 400 085
Trombay, Mumbai- 400 085

भारत सरकार
GOVERNMENT OF INDIA
भाभा परमाणु अनुसंधान केन्द्र
BHABHA ATOMIC RESEARCH CENTRE
रसायनिक अभियांत्रिकी वर्ग
CHEMICAL ENGINEERING GROUP
DESALINATION DIVISIO

Ref: DD/TDS/SM/F&R-1/ 2019 **Date: 02/04/2019**

Sub: Invitation to submit your quotation

On behalf of the President of India, **Head, Desalination Division, Chemical Engineering Group (ChEG)**, Bhabha Atomic Research Centre invites quotation in sealed envelope for the work given below as per the technical specifications enclosed in Annexure-1.

S. No.	Description of Job	Completion Period
1	Supply, Fabrication, Erection, Testing and Commissioning of LT panel, Cable and associated work for existing plant at Desalination Division, BARC, Mumbai.	90 days from the date of issue of work order

The terms and conditions are given below:

1. **Qualifying Criteria for Bidders:**
   1.1. Firms willing to bid for above mentioned job shall have been vetted by Security Section of BARC.
   1.2. All the supervisors and workers should have valid Police Verification Certificate (PVC). The list of manpower available with firm shall be submitted along with their details of PVC with quotation.
   1.3. The experience of the firm in similar nature of work in BARC/DAE shall be made available with work order copy and satisfactory completion certificate from the user.
2. Interested bidders shall contact the undersigned on Phone No. 2559 4747/40 (Ext. No.: 24747/40) for any other query.
3. **The quotation envelope shall be superscripted with description of the job and the Tender Ref. No. mentioned above along with Due Date.**

4. The complete quotation shall reach the following address on or before **26th April, 2019,** by 16.00 hrs **only Indian Postal Service.**

Head of Division
Desalination Division
Bhabha Atomic Research Centre
Trombay, Mumbai -400085
Kind Attention: **S Mukhopadhyay, SO/D**

5. **Printed Letter Head**: Quotation should be printed on the letter head; computer generated quotation is not valid.
6. **Validity of the Offer**: Validity of the offer shall be **90 days** from date of opening of quotation.
7. **Guarantee**: Bidder shall have to give guarantee of the quality and workmanship of work done for the period of 12 months from the date of completion of the work.
8. **Offer of Firm:** Offer of those bidders, who do not submit their quotation as per the details given in the technical specification and incomplete quotations in any respect shall not be considered.
9. The department reserves right to extend the date of opening the quotations.
10. **Payment Terms:** Accounts Division, BARC, Mumbai-400085 shall make full and final payment only after submission of the satisfactory work completion certificate & site clearance certificate issued by the undersigned, bill, advanced stamped receipt, delivery challan and guarantee certificate. No advance is admissible.
11. **Income Tax Recovery Clause:** Income tax @ 2% will be deducted from the bill.
12. If any of the employee, consultant or partner of the bidder's company is an Ex-BARC employee, the same must be stated in the quotation clearly.
13. **Penalty:** Any delay, which is attributable to the contractor, is liable for penalty @ 0.5% per week (max. 5%) and shall be imposed on contractor.
14. **GST/PAN Number:** Quotation must contain the GST and PAN number of the firm.
15. **Concessional GST**: Since the goods are to be supplied against the work order meant for research purpose of a research organization under DAE, concessional GST @ 5% will be applicable. Exemption certificate for concessional GST shall be provided separately.
16. **Quantity Variation Clause:** Quantity variation of ± 20% is possible during the execution of the job. Payment shall be made based on the actual work carried out by the contractor after completion of entire job

17. Only Electric supply 415 volts, 3 phases, 50 Hz & water will be supplied by BARC at free of cost.

18. Safety Rule: The contractor shall follow all the safety procedures as per the normal industrial practice during the execution of the job at site. Any mishap occurring during the work due to unsafe workmanship shall be the contractor's liability.

19. The buy-back arrangement shall be followed, wherever applicable, for the disposal of scrap/ garbage, redundant stores and debris, etc.

20. The contractor should ensure that the scrap generated at the work place during the work should be carried safely to the designated place at BARC. The job completion certificate will be issued only after clearing of all such materials from the work premises of BARC.

21. Housekeeping at the work place during the work is the sole responsibility of the contractor.

22. Confidential Clauses:

i. Confidentiality: No party shall disclose any information to any third party concerning matters under this contract generally, in particular, any information identified as "Proprietary" in nature by the disclosing party shall be kept strictly confidential by the receiving party shall not be disclosed to any third party without the prior written consent of the original disclosing party. This clause shall apply to the sub-contractors, consultants, advisors, or the employees engaged by a party with equal force.

ii. "Restricted information" categories under Section 18 of the Atomic Energy Act, 1962 and "Official secrets" under section 5 of the of the Official Secret Act, 1923: Any contravention of the above-mentioned provisions by any contractor, sub- contractor, consultant, advisor or the employee of a contractor will invite Penal consequences under the aforesaid legislation.

iii. Prohibition against use of BARC's name without permission for any publicity purpose: The contractor or sub-contractor, consultant, advisor or the employees engaged by the contractor shall not use BARC's name for any publicity purpose through any media like press, TV or internet, without the prior written approval of BARC.

23. Security Rules:

a) Police verification certificates (PVC) are required for supervisors and laborers deployed at the site.

b) Security rules and transport rules at BARC, Trombay premises shall be strictly followed.

c) Laborers below 18 years of age shall be not allowed to work at site.

S Mukhopadhyay
Scientific Officer (D)
DD, BARC

Annexure - 1

1. Job Name:

Supply, Fabrication, Erection, Testing and Commissioning of LT panel, Cable and associated work for existing plant at Desalination Division, BARC, Mumbai

2. Commercial terms and conditions:

2.1 **Quote Format**: Bidder is requested to quote for the above job **on lump-sum/break-up basis as per the scope of work** along with applicable taxes. Quotation price format will be like Rs…….. (Basic lumpsum cost) + Rs…….applicable taxes (GST) = Rs…….. (Total cost).

2.2 A Xerox copy of PAN CARD, PVC of Proprietor or company is to be attached with quotation along with providing GST no. etc.

2.3 **Payment terms**: Payment shall be released within 60 days after satisfactory completion of work at BARC.

2.4 **Mode of payment**: Payment will be released through ECS, the party has to fill the ECS/RTG form and submit with the delivery challan and Bill/Tax Invoice.

2.5 **Inspection Clause:** The work will be subjected to inspection by our engineers during fabrication at our work place before final acceptance.

3.0 Criteria for Evaluation of Tender:

3.1 Evaluation will be done based on consolidated price.

3.2 Technical suitable lowest consolidated offer will be considered for awarding the work order.

4 Scope of work

Sr No	Equipment description in brief	Technical Specification No.	Quantity	Unit
1.	Supply, installation and commissioning of LT panel	TSS 01	1	No
2.	Supply, installation and commissioning of control panel for electrode boiler	TSS 01_1	1	No
3.	Supply, installation and commissioning of 25 mmx 6 mm Tinned Cu strip	TSS 02	200	mtr
4.	Supply, installation and commissioning of Cu plate	TSS 02	10	Nos.
5.	Supply, installation and commissioning of 3C X 6 sq. mm round armoured cu cable	TSS 03	150	mtr
6.	Supply, installation and commissioning of 4C X 2.5 sq. mm round armoured cu cable	TSS 03	150	mtr
7.	Supply, installation and commissioning of 3C X 4 sq. mm round armoured cu cable	TSS 04	100	Mtr.
8.	Supply, installation and commissioning of 1C x 35 Sq. mm Cu cable	TSS 04	200	mtr
9.	Supply, installation and commissioning of 3.5C X 35 sq. mm flat armoured cu cable	TSS 04	100	mtr
10.	Supply, installation and commissioning of 10C X 1.5 sq. mm round armoured cu cable	TSS 04	100	mtr
11.	Supply, installation and commissioning of 6C x 1.5 Sq. mm round Armoured Cu cable	TSS 04	100	mtr.
12.	Supply, installation and commissioning of Earth Station	TSS 05	2	Nos.
13.	Supply, installation and commissioning of 3C X 6 sq. mm armoured cu cable End termination	TSS 06	10	Set
14.	Supply, installation and commissioning of 4C X 2.5 sq. mm armoured cu cable End termination	TSS 06	10	Set
15.	Supply, installation and commissioning of 3C X 4 sq. mm armoured cu cable End termination	TSS 06	12	Set
16.	Supply, installation and commissioning of 1C x 35 Sq. mm Cu cable End termination	TSS 06	20	Set
17.	Supply, installation and commissioning of 3.5C X 35 sq. mm armoured cu cable End termination	TSS 06	8	Set
18.	Supply, installation and commissioning of 10C X 1.5 sq. mm armoured cu cable End termination	TSS 06	8	Set
19.	Supply, installation and commissioning of 6C x 1.5 Sq. mm Armoured Cu cable End termination	TSS 06	20	Set
20.	Supply, installation and commissioning of 3.5C x 300 Sq. mm Armoured Cu cable End termination	TSS 06	2	Set
21.	Supply, installation and commissioning of Cable tray (ladder) of 200 mm width	TSS 07	25	mtr.
22.	Supply, installation and commissioning of Cable tray (perforated) of 200 mm width	TSS 07	25	mtr.

Document No:- TSS 01		
LT Panel		
S. No.	Particulars	**Tender Specifications**
A	Scope	1. General specification for design, fabrication/ manufacturing, inspection, testing, delivery at site, installation, testing & commissioning etc of "LT Switchboard" 2. Removing existing LT switchbiard with opening all the incomer cable and outgoing cable. Removing all the feeder cable from source to destination. (Max 10 outgoing feeder is there). Shifting of LT panel to the desired location as direct by the dpt. is in the scope of vendor.
B	Specification	
1	General Particulars	
1.1	Project Site	
1.1.1	Climatic condition	Near to sea coast. Atmosphere is laden with salty spray. Climate is tropical with high humidity. Annual rainfall is 2000 mm
1.1.2	Maximum ambient temp	45 deg C
1.1.3	Humidity (RH)	95% at 45 deg C
1.1.4	Altitude	Mean sea level
1.2	Preferred make	Siemens/Schneider Electric/L&T/Popular/Arrow Engineers/ Pyrotech/Dharia Switchgear
1.3	System Particulars	
1.3.1	Nominal System Voltage	415 V
1.3.2	System Voltage Variation	10%
1.3.3	Frequency	50 Hz
1.3.4	System Grounding	Effectively earthed
1.3.5	Number of phases	TPN
1.4	Standard	IS 8623 / IEC60439
1.5	Type of PCC/MCC	Metal clad and indoor
1.6	One minute power frequency voltage	
1.6.1	For power circuits	2.5kV
1.6.2	For control circuits	2kV
1.6.3	For circuits connected to CT secondary	2kV
1.7	Reference design ambient temp (Amb T)	45 degC
1.8	Rated normal current of bus bar inside cubicle at (Amb T)	
1.8.1	Bus bar material	Electrolytic grade Copper
1.8.2	Size of bus bar	As per manufacturer standard (Suitable for continous current of 400A and short circuit of 50 KA for 1 sec. (Type tested))
1.9	Max. temp. at continuous current rating under (Amb T)	As per IS/IEC
1.10	Short circuit withstand for bus bars for one sec	50 kA (RMS)
2	**Constructional Particulars**	
2.1	Sheet metal	CRCA sheet

2.2	Thickness of sheet	2 mm for doors and enclsoure and 1.6mm for partition between compartments
2.3	Treatment and Painting	Phosphating and powder coated
2.4	Colour finish shade	
2.4.1	Inside	Siemens grey (RAL 7032)
2.4.2	Outside	Siemens grey (RAL 7032)
2.5	Base frame	MS ISMC part of this item
2.6	Earth bus bar material and size	Tinned copper strip
2.7	Clearance in air of live parts	
2.7.1	Phase to phase	Min 25 mm
2.7.2	Phase to earth	Min 19 mm
2.8	Overall size	As per site reqt
2.9	Cable entry	Top entry
2.10	Single front/double front	Single front
2.11	Degree of protection	Min. IP 42. Panel shall be type tested.
2.12	Access to cable alley and bus bar chamber	Front access cable alley and bus bar chamber.
2.13	Type & size of panel	Cubicle & compartmentalised.
3	**Auxiliary Components.**	
3.1	Space heaters	
3.1.1	Type	Strip type
3.1.2	Voltage	Single phase, 240 V AC, 50 Hz
3.1.3	kW rating and quantity in numbers	As per manufacturer design (two numbers to be connected in series
3.2	Panel Light	
3.2.1	Type	Fluorescent fixture
3.2.2	Voltage	240V, single phase, 50 Hz
3.3	Receptacle	
3.3.1	Type	Industrial
3.3.2	Rating	240V AC, single phase, 50 Hz, 5A, 3 pin
3.3.3	Switching	Switch
4	**Feeder Components .**	
4.1	Terminations	
4.1.1	Power connection to bus bar	
4.1.1.1	For feeders rated above 63A	Extended copper bar
4.1.1.2	For feeders rated up to 63A	FRLS grade PVC insulated stranded copper wire (25 sq.mm for 63A and 16 mm for 32A)
4.1.2	Power terminal (in cable alley)	Extended copper strips/Stud type terminals
4.1.3	Control connection	1.5 sq.mm
4.1.4	Control terminal	Connector in cable chamber/Metering compartment
4.1.5	CT terminal	Connector in cable chamber/Metering compartment
4.2	Moulded case circuit breaker (MCCB)	
4.2.1	Preferred make	Siemens/Schneider/ABB/L&T/GE
4.2.2	Rated current inside cubicle at (Amb T)	As per feeder type
4.2.3	Voltage, frequency	415 V, 50 Hz
4.2.4	Utilization category	A
4.2.5	Rated breaking capacity	I (Ultimate)= I (Service)= 50 kA (RMS)
4.2.6	Operating mechanism	Manual with extended rotary handle
4.2.7	No. of poles	As per feeder type

4.3	Current transformer	
4.3.1	Preferred make	Kappa/Indcoil/Pragati /AE
4.3.2	Type	Cast resin
4.3.3	System voltage & frequency	415 V, 50 Hz
4.3.4	Power frequency withstand	3 kV
4.3.5	Class of insulation	Class-B or better
4.3.6	Winding material	Copper
4.3.7	Rated primary current and ratio	As per feeder type
4.3.8	Short time current rating (1 Second)	50 kA (RMS)
4.3.9	Accuracy class & burden	
4.3.9.1	For metering	Class 1 , 15 VA
4.4	Indicating lamps	
4.4.1	Preferred make	Teknic/L&T/Schneider/Siemens
4.4.2	Type	LED type lamps, screw type replaceable for each indication
4.4.3	Size	22 mm dia
4.4.4	Quantity	As per drawing
4.5	Multifunction digital meter (MDM)	Required at incomer of panel
4.5.1	Preferred make	AE, Siemens, Enercon, Schneider
4.5.2	Accuracy class	Class 1
4.5.3	Voltage input	230V and 415V (selectable at site)
4.5.4	Current input	5A
4.5.5	Measurement	V, I, kW, kWH, kVA, kVAR, Pf, Hz
4.5.6	Display	LCD type
4.5.7	Communication	RS485 port, IEC61850
4.6	Selector switch (Main/standby & Auto/Local/Remote mode))	
4.6.1	Preferred make	L&T/Siemens/Kaycee/Schneider
4.6.2	Number of positions and poles	As per feeder type
4.6.3	Type	Rotary
4.7	Push buttons (On/ Off)	
4.7.1	Number and type of contacts	As per feeder type
4.7.2	Diameter	22.5mm
4.7.3	Current rating of contacts	4A
4.7.4	Preferred make	Siemens/ L & T/ Teknic
4.8	Control circuit	
4.8.1	Protected by	MCB
4.8.2	Rated current	As per manufacturer design
4.8.3	No. of poles of MCB	As per manufacturer design
4.8.4	Schematic drawing	As per feeder type
5	Feeder Types, their Components with quantity	
5.1	Feeder no and type	AS per SLD
5.1.1	Terminations	
5.1.1.1	Power connection (External)	Shall be Suitable for feeder current rating
5.1.1.2	Power terminal (External)	Power connectors
5.1.2	Moulded case circuit breaker	
5.1.2.1	Preferred make	Schneider/ Siemens/ L&T
5.1.2.2	Rated current inside cubicle at (Amb. T)	AS per SLD and for motor from type 2 coordination chart
5.1.2.3	Release Type	TM based / Microprosseor Based (UP) as per SLD. For microprosseor based MCCB the trip unit shall be of MTX2.0 of M/s L&T/Micrologic 2.2 / 2.3 of M/s Schneider / ETU 350 of M/s Siemens

5.1.3	Current transformer	
5.1.3.1	Rated primary current and ratio	Suitable to feeder current rating
5.1.3.2	Metering CT	As per SLD
5.1.4	Selector switch (Main/standby & Auto/Local/Remote mode))	As per control circuit diagram
5.1.4.1	Number of positions and poles	As per control circuit drawing
5.1.5	Control circuit	1 Set
5.1.6	Elmex connectors	Lot. Approx 20% spare terminal blocks to be provided.
5.1.7	Control Wiring	Lot. Approx 20% spare terminal blocks to be provided.
6	Spare breaker	Microprosseor Based (UP) MCCB with trip unit shall be of MTX2.0 of M/s L&T/ Micrologic 2.2 / 2.3 of M/s Schneider / ETU 350 of M/s Siemens of current rating 125 A and 63 A
C	Testing During Inspection at Manufacturer works	1. All bought out components certificates 2. Visual checks of Panels 3. Bill of material and wiring check of full aseeembly 4. Functional Checks 5. Insulation Resistance Test (Before & After HV Test) 6. High Voltage Test 7. Temperature Rise Test
D	Installation	The panels shall be installed on RCC floor. Installation including positioning, leveling etc complete with all accessories, grouting of bolts in the floor as per site requirement. All the material required for installation of the panel is in the scope of the bidder.
E	Testing & commissioning	Site Tests: 1. Insulation Resistance Test 2. Functional Checks 3. Visual Checks
F	Dcoumentation	2 sets of hardcopy of Documentation reports including as-built drawing of panel, factory test report, site test results, user manual of all components shall be submitted.
G	Drawing & Bill of material approval before placement of order.	All the drawings & Bill of material of panel to be got approved from E-i-C before placement of order.

Document No:- TSS 01_1		
Equipment : Control Panel for Electrode Boiler		
S. No.	Particulars	**Tender Specifications**
A	Scope	1. General specification for design, fabrication/ manufacturing, inspection, testing, delivery at site, installation, testing & commissioning etc of "Control Panel" 2. Removing existing Panel with all the incomer cable and outgoing cable. Removing all the feeder cable from source to destination. (Max 10 outgoing feeder is there). Shifting of LT panel to the desired location as direct by the dpt. is in the scope of vendor. 3. Termination of existing control cable from PLC panel to newly installed boiler control panel
B	Specification	
1	General Particulars	
1.1	Project Site	
1.1.1	Climatic condition	Near to sea coast. Atmosphere is laden with salty spray. Climate is tropical with high humidity. Annual rainfall is 2000 mm
1.1.2	Maximum ambient temp	45 deg C
1.1.3	Humidity (RH)	95% at 45 deg C
1.1.4	Altitude	Mean sea level
1.2	Preferred make	Siemens/Schneider Electric/L&T/Popular/Arrow Engineers/ Pyrotech/Dharia Switchgear
1.3	System Particulars	
1.3.1	Nominal System Voltage	230 V, AC, 1 phase, 50 HZ & 24 V DC
1.3.2	Type of panel	Non Compartmentalized Panel
2	**Constructional Particulars**	
2.1	Sheet metal	CRCA sheet
2.2	Thickness of sheet	2 mm for doors and enclsoure and 1.6mm for partition between compartments
2.3	Treatment and Painting	Phosphating and powder coated
2.4	Colour finish shade	
2.5	Inside	Siemens grey (RAL 7032)
2.6	Outside	Siemens grey (RAL 7032)
2.7	Base frame	MS ISMC part of this item
2.8	Earth terminal	Required
2.9	Overall size	As per site reqt
2.1	Cable entry	Bottom entry
2.11	Single front/double front	Single front
2.12	Degree of protection	WP type for outdoor installation. Box Inbox type design with front glass door to see the control parameter.
2.13	Access to cable alley and bus bar chamber	Front access cable alley and bus bar chamber.
2.14	Type & size of panel	Cubicle & compartmentalised.
3	**Auxiliary Components.**	
3.1	**Panel Light**	
3.1.1	Type	Fluorescent fixture
3.1.2	Voltage	240V, single phase, 50 Hz
3.2	**Receptacle**	
3.2.1	Type	Industrial
3.2.2	Rating	240V AC, single phase, 50 Hz, 5A, 3 pin
3.2.3	Switching	Switch
3.3	**Control Circuit**	
3.3.1	Component	As per Control circuit diagram
3.3.2	**Indicating lamps**	

3.3.2.1	Preferred make	Teknic/L&T/Schneider/Siemens
3.3.2.2	Type	LED type lamps, screw type replaceable for each indication
3.3.2.3	Size	22 mm dia
3.3.2.4	Quantity	As per drawing
3.3.3	**Selector switch (Main/standby &**	
3.3.3.1	Auto/Local/Remote mode))	
3.3.3.2	Preferred make	L&T/Siemens/Kaycee/Schneider
3.3.3.3	Number of positions and poles	As per feeder type
3.3.3.4	Type	Rotary
3.3.4	**Push buttons (On/ Off)**	
3.3.4.1	Number and type of contacts	As per feeder type
3.3.4.2	Diameter	22.5mm
3.3.4.3	Current rating of contacts	4A
3.3.4.4	Preferred make	Siemens/ L & T/ Teknic
3.3.4.5	Qunatity	As per control digram
3.3.5	**Control circuit**	
3.3.5.1	Protected by	MCB AC / DC MCB / Fuse
3.3.5.2	Rated current	As Required
3.3.5.3	No. of poles of MCB	As required (Main incomer will be 2P)
	Application	Main DC Bus will be protected by DC MCB individual equipment will be protected by
3.3.5.4	Schematic drawing	As per feeder type
3.3.6	Power Cable termination	1 Lot. (Elmex). Approx 20% spare terminal blocks to be provided.
3.3.7	Control Wiring	As per control circuit reqt. Wiring with FRLS grade wire from auxiliary contactors / relays / devices up to terminal block / devices shall be carried out. CT wiring to be done so that One CT will connect two ammeter in series (one in panel supplied by vendor one in remote location)
3.3.8	**SMPS**	Input of 230 V AC, output of 24 V DC, Efficiency minimum 80%
3.3.8.1	Input Voltage	200-240 V AC, 50 HZ
3.3.8.2	Output Voltage	24 V DC (22-26 V DC)
3.3.8.3	Current rating	5 Amp
3.3.8.4	Load regulation	3%
3.3.8.5	Efficiency	Minimum 80 %
3.3.8.6	Power factor	0.65 Minimum
3.3.8.7	Internal protectrion	Overload, Against short-circuits, protection technology: automatic reset, Thermal
3.3.8.8	Qunatity	1 NO
3.3.9	**Current transducer**	
3.3.9.1	Power Supply	24 V DC
3.3.9.2	Input	CT output (100/5 A)
3.3.9.3	Output	4-20 mA
3.3.9.4	Mounting	Din rail
3.3.9.5	Quantity	2 Nos.
3.3.10	**Digital Ammeter**	
3.3.10.1	Power Supply	230 V AC/ 24 DC
3.3.10.2	Input	3 phase CT output current 1A/ 5 A site selectable
3.3.11	**Annunciator block with hooter**	
3.3.11.1	Make	Minilac/ IIC
3.3.11.2	Windows	16
3.3.11.3	Display	LCD
3.3.11.4	Auxiliary supply	230 V AC/ 24 DC

3.3.11.5	Control	Alarm accept push button, mute button, reset button is required
3.3.11.6	Qunatity	1 no
3.3.12	Electromagnetic Relay	
3.3.12.1	Make	Schneider/ Omron/
3.3.12.2	Pole	2P/4P as per diagram
3.3.12.3	Supply voltage	24 V DC
3.3.12.4	Type	Built-in diodes and operation indicators
3.3.12.5	Type of Pole	SPDT
3.3.12.6	Plug	Required din rail mounted.
3.3.12.7	Coil impedance	Manufacture std.
3.3.13	**Current realy**	
3.3.13.1	Make	Schneider
3.3.13.2	Auxiliary Power supply	230 V AC/ 24 DC
3.3.13.3	Input	CT output current upto 5 A
3.3.13.4	Output	2 CO relay contact of 2 A , 24 V DC
3.3.13.5	Settings	Potentiometer for current setting
3.3.13.6	Quantity	2 No.
C	Testing During Inspection at Manufacturer works	1. All bought out components certificates 2. Visual checks of Panels 3. Bill of material and wiring check of full aseeembly 4. Functional Checks 5. Insulation Resistance Test of control circuit
D	Installation	The panels shall be installed on MS skid. Installation including positioning, leveling etc complete with all accessories, in the skid as per site requirement. All the material required for installation of the panel is in the scope of the bidder.
E	Testing & commissioning	Site Tests: 1. Insulation Resistance Test 2. Functional Checks 3. Visual Checks
F	Dcoumentation	2 sets of hardcopy of Documentation reports including as-built drawing of panel, factory test report, site test results, user manual of all components shall be submitted.
G	Drawing & Bill of material approval before placement of order.	All the drawings & Bill of material of panel to be got approved from E-i-C before placement of order.

TSS no. 02

Technical specification of copper strip and plate for earthing

Scope- Supply, installation, testing of Copper strips and plate as size indicated in Schedule.

1. Material of strips: High conductivity copper, minimum purity 99.5%
2. Tinning required: Yes, tinned
3. Sizes of strips & plates: as per the schedule of quantity. Plate will be predrilled (6 nos. holes). Size of the plate will be 150 mm x 50 mm x 6 mm.
4. Installation: with GI saddles (1.6 mm thick) and GI spacers (6 mm thick) on walls / beams / trenches / trays etc. Plate will be installed in wall with cone type SMC insulator (1.1 kV) support. Insulator is included in the item. Two Insulators are required for installation of one plate.
5. Joints: Shall be bolted and brazed both. Existing joints will also be brazed (25 Nos.)
6. Material Testing: Material sample shall be tested at NABL approved lab for testing of purity of copper. (Certificate to be submitted)
7. Testing of earthing grid system: Continuity test shall be conducted at site for various earthing grids.
8. Makes of material: Any reputed make meeting the specification

Document No. : TSS 03		
LT cable		
S. No.	Particulars	Specified by BARC
	Scope	1. Offered General specification for design, fabrication / manufacturing, inspection, testing, delivery, installation and commissioning of "LT cable 2. Removing existing cable from panel to motor.
1	General	
1.1	Project Site	
1.1.1	Climatic condition	Near to sea coast. Atmosphere is laden with salty spray. Climate is tropical with high humidity. Annual rainfall is 2000 mm
1.1.2	Maximum ambient temp	45 degC
1.1.3	Humidity (RH)	95% at 45 degC
1.1.4	Altitude	Mean sea level
2	Name of manufacturer	Polycab/Universal/CCI/Finolex/ Torrent/ Nicco/Havells/ Gemscab/Uniflex/KEI/ LAPP/ KEC/ Gupta Power
3	Type of cable	LT power cable
4	Voltage grade	1100 V AC (Effectively Earthed)
5	Core	
5.1	Core identification	Colouring (Red, Yellow, Blue, Black)
5.2	Nos. of cores	as indicated in schedule of qty
6	Conductor	
6.1	Type of conductor	Stranded
6.2	Conductor size	as indicated in schedule of qty
6.3	Conductor material	as indicated in schedule of qty
6.4	Form of conductor	as indicated in schedule of qty
6.5	Max. temp. of conductor	90 degC
6.6	Class of conductor	Class -2 as per IS-8130
7	Insulation	
7.1	Type of Insulation	Cross linked polyethylene as per IS 7098 (Part-1)
7.2	Nominal thickness of insulation	As per table 2 of IS 7098 (Part-1)
8	Filler material	HR PVC (Withstand temp. upto 85 deg C)
9	Inner sheath	
9.1	Type of material of inner sheath	PVC, Type ST2 as per IS 5831
9.2	Inner sheath type	Extruded

9.3	Thickness of inner sheath	As per table 3 of IS 7098 (Part-1)
10	Armour	
10.1	Armour material	Low carbon galvanised steel wire as per IS 3975
10.2	Shape of armour conductor	Round wire
10.3	Nos. of layers of armour wire	Single layer
10.4	Size of Armour conductor	As per table 4 of IS 7098 (Part-1)
11	Outer Sheath	
11.1	Outer sheath material	FRLS PVC, Type ST2 as per IS 5831
11.2	Colour of outer sheath	Black
11.3	Thickness of outer sheath	As per table 5 of IS 7098 (Part1)
11.4	Embossed identification mark on outer sheath	FRLS, 1.1 KV, XLPE, No. of core, conductor size, conductor material , Make and year of manufacturing
11.5	Printed mark on outer sheath	Sequential length in each metre
12	Cable drum	Non-returnable
12.1	Material of construction of cable drum	Wooden drum for 200 m cable
12.2	Minimum gap between top layer and packing planks	As per manufacturer std.
12.4	length of cable on one drum	As per quantity
13	Cable sizes	Quantity as per tender schedule of quantity, However the exact qty of the cable shall be approved during datasheet approval.
15	Inspection and testing	The following acceptance test will be carried out in the presence of our engineer before delivery at manufacturer's works and supplier has to intimate this office at least 15 days in advance to enable us to depute our Engineer to witness the test. The following shall constitute the acceptance test.
15.1.	Continuity test	To be done before supply
15.2.	HV test	To be done before supply
15.3	Tensile test (for Aluminum) (as per IS:8130)	Test Certificate are required from manufacturer
15.4	Wrapping test (for Aluminum) (as per IS:8130)	Test Certificate are required from manufacturer
15.5	Conductor resistance test (as per IS:8130)	Test Certificate are required from manufacturer

15.6	Test for thickness of insulation and sheath (as per IS:5831-1970)	Test Certificate are required from manufacturer
15.7	Insulation resistance test (as per IS:5831-1970)	Test Certificate are required from manufacturer
15.8	High voltage test.	Test Certificate are required from manufacturer
15.9	volume resistivity test	Test Certificate are required from manufacturer
15.10	In addition to usual acceptance tests certificate is required for XLPE cables,	
15.9.1	Flammability test as per SS-424-1417 or IEC-60332	
15.9.2	Oxygen index test as per ASTMD-2863	
15.9.3	Temperature index test as per ASTMD-2863	
15.9.4	Smoke density test as per IEC 61034/ASTMD 2843	
15.9.5	Acid gas emission test as per IEC 60754-2	
16	Cable installation (Surface laying)	The cable shall be laid on cable tray/inside trench/wall including supply of all required materials, suitable size of m.s. clamps with screws, GI spacers fixed with nettle fold long wood screw/ m.s. saddles, painting, etc complete in all respects including supply of all required materials and as per actual site conditions.

Document No. : TSS 04		
LT cable		
S. No.	Particulars	Specified by BARC
	Scope	1. Offered General specification for design, fabrication / manufacturing, inspection, testing, delivery, installation and commissioning of "LT cable.
1	General	
1.1	Project Site	
1.1.1	Climatic condition	Near to sea coast. Atmosphere is laden with salty spray. Climate is tropical with high humidity. Annual rainfall is 2000 mm
1.1.2	Maximum ambient temp	45 degC
1.1.3	Humidity (RH)	95% at 45 degC
1.1.4	Altitude	Mean sea level
2	Name of manufacturer	Polycab/Universal/CCI/Finolex/ Torrent/ Nicco/Havells/ Gemscab/Uniflex/KEI/ LAPP/ KEC/ Gupta Power
3	Type of cable	LT power cable
4	Voltage grade	1100 V AC (Effectively Earthed)
5	Core	
5.1	Core identification	Colouring (Red, Yellow, Blue, Black)
5.2	Nos. of cores	as indicated in schedule of qty
6	Conductor	
6.1	Type of conductor	Stranded
6.2	Conductor size	as indicated in schedule of qty
6.3	Conductor material	as indicated in schedule of qty
6.4	Form of conductor	as indicated in schedule of qty
6.5	Max. temp. of conductor	90 degC
6.6	Class of conductor	Class -2 as per IS-8130
7	Insulation	

7.1	Type of Insulation	Cross linked polyethylene as per IS 7098 (Part-1)
7.2	Nominal thickness of insulation	As per table 2 of IS 7098 (Part-1)
8	Filler material	HR PVC (Withstand temp. upto 85 deg C)
9	Inner sheath	
9.1	Type of material of inner sheath	PVC, Type ST2 as per IS 5831
9.2	Inner sheath type	Extruded
9.3	Thickness of inner sheath	As per table 3 of IS 7098 (Part-1)
10	Armour	
10.1	Armour material	Low carbon galvanised steel wire as per IS 3975
10.2	Shape of armour conductor	Round wire
10.3	Nos. of layers of armour wire	Single layer
10.4	Size of Armour conductor	As per table 4 of IS 7098 (Part-1)
11	Outer Sheath	
11.1	Outer sheath material	FRLS PVC, Type ST2 as per IS 5831
11.2	Colour of outer sheath	Black
11.3	Thickness of outer sheath	As per table 5 of IS 7098 (Part1)
11.4	Embossed identification mark on outer sheath	FRLS, 1.1 KV, XLPE, No. of core, conductor size, conductor material , Make and year of manufacturing
11.5	Printed mark on outer sheath	Sequential length in each metre
12	Cable drum	Non-returnable
12.1	Material of construction of cable drum	Wooden drum for 200 m cable
12.2	Minimum gap between top layer and packing planks	As per manufacturer std.
12.4	length of cable on one drum	As per quantity

13	Cable sizes	Quantity as per tender schedule of quantity, However the exact qty of the cable shall be approved during datasheet approval.
15	Inspection and testing	The following acceptance test will be carried out in the presence of our engineer before delivery at manufacturer's works and supplier has to intimate this office at least 15 days in advance to enable us to depute our Engineer to witness the test. The following shall constitute the acceptance test.
15.1.	Continuity test	To be done before supply
15.2.	HV test	To be done before supply
15.3	Tensile test (for Aluminum) (as per IS:8130)	Test Certificate are required from manufacturer
15.4	Wrapping test (for Aluminum) (as per IS:8130)	Test Certificate are required from manufacturer
15.5	Conductor resistance test (as per IS:8130)	Test Certificate are required from manufacturer
15.6	Test for thickness of insulation and sheath (as per IS:5831-1970)	Test Certificate are required from manufacturer
15.7	Insulation resistance test (as per IS:5831-1970)	Test Certificate are required from manufacturer
15.8	High voltage test.	Test Certificate are required from manufacturer
15.9	volume resistivity test	Test Certificate are required from manufacturer
15.10	In addition to usual acceptance tests certificate is required for XLPE cables,	
15.9.1	Flammability test as per SS-424-1417 or IEC-60332	
15.9.2	Oxygen index test as per ASTMD-2863	
15.9.3	Temperature index test as per ASTMD-2863	
15.9.4	Smoke density test as per IEC 61034/ASTMD 2843	
15.9.5	Acid gas emission test as per IEC 60754-2	

16	Cable installation (Surface laying)	The cable shall be laid on cable tray/inside trench/wall including supply of all required materials, suitable size of m.s. clamps with screws, GI spacers fixed with nettle fold long wood screw/ m.s. saddles, painting, etc complete in all respects including supply of all required materials and as per actual site conditions.

TSS 05

Title: Earthing station		
1. Applicable standards: IS 3043 with latest revisions.		
Sr. No.	Parameter	Tender specification
1	General:	
1.1	Type	Pipe type earthing
1.2	Size of the plate	As per IS 3043
1.3	earting Pipe material	GI
1.4	Size of pipe up to earthing chamber	As per IS 3043
1.6	Charcoal and Salt	Required Qty in alternate layer up to 2.5 Mtr in 150 mm height and 300 mm dia hole as per IS 3043
1.7	Minimum depth	1000 mm from finished ground level
1.8	watering pipe	same pipe will be used for watering purpose with suitable size funnel with wire mesh and GI check nut
1.9	earthing chamber	300 x 300 mm bricks with plastering earthing station chamber 100 mm above the ground level.with Cast iron cover hinged to CI frame.
1.10	Marking on earthing station	Pit no painted on the MS sheet fixed with M S angle near the pit wall as well marking pit no with paint on the cover plate.
1.11	Clamp	Proper clamp with nut and bolt shall be provide for connection to the earthing GI strips to earthing station.
1.12	Testing & Inspection	The earthing station resistance value shall be measured with resistance megger in presenec of departmental person.
1.13	Site test report	After commissioing the site test reports of resistance value (Min 3 reading) shall be submitted

Document No. : TSS 06		
SCOPE OF DOCUMENT:- Offered General specification for design, fabrication/ manufacturing, inspection, testing, delivery, installation and commissioning of "LT cable end termination "		
Equipment : LT cable end termination		
S. No.	Particulars	Specified by BARC
1	General	
1.1	System Voltage	415 V , 3 Ph
1.2	Frequency	50 Hz
1.3	System Earthing	Effectively earthing
2	Type of termination	End termination of cables at the Panel side and at motor etc.
3	Types of lugs	Heavy duty crimping type Copper lugs
4	Type of gland	Single compression brass
5	Earthing of the gland	Shall be done with suitable clamp and suitable earthing wire from the nearby earthing network at no extra cost.
6	Installation of Gland	Making of proper size cut out (hole) in the panel gland plate, crimping of lugs, earthing, insulation tapping etc required for proper installation of the end termination of cable.
7	Make of material	Braco / Comet/Dowell / Janson
8	End terminal	End terminal for power cable is required at panel end. Stud type with protective covering in din rail mounted of appropriate size. (Elmex or equivalent)
9	Size	As per BOQ table.

TSS no.07

TECHNICAL SPECIFICATION FOR GI CABLE TRAY

Supply, fabrication and installation of GI cable tray, ladder type/perforated type as follows:

TECHNICAL SPECIFICATION FOR GI CABLE TRAY

Supply, fabrication and installation of GI cable tray, ladder type/ as follows:

1. Preferred make
   M/s. Indiana Cable Tray Corporation, M/s Asian Ancillary Corporation, M/s Metallamn and any other reputed make subject to approval of BARC

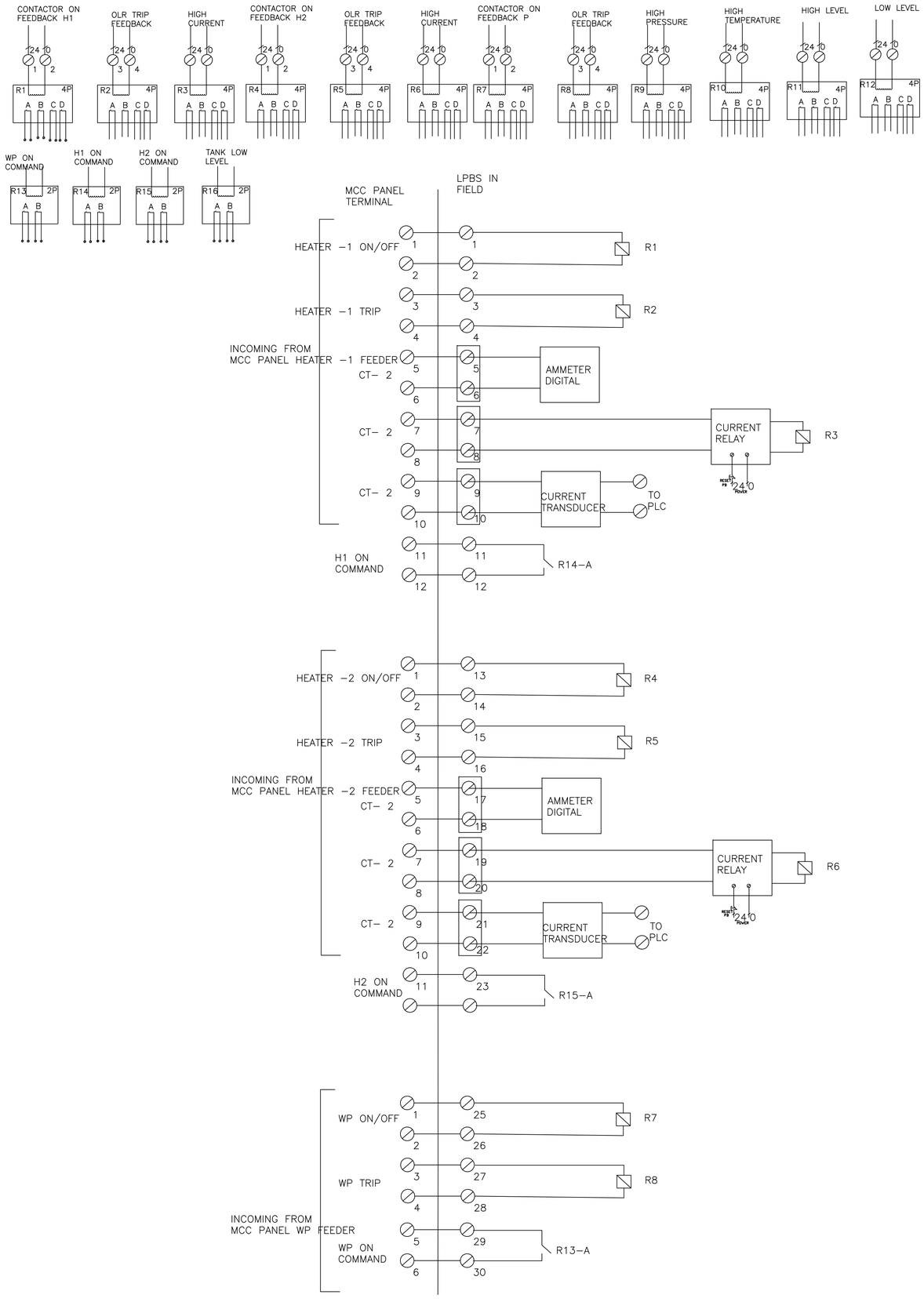
2. Construction
   Ladder Type (Straight run)
   Different sizes (as per schedule of quantities) ladder type cable tray with side channel of 50mm and inside rings of 35 x 15mm, center to center distance of 250mm fabricated out of 2mm thick M. S. sheet rungs thickness 2mm in standard lengths of 2.5 mtrs. Material used for above shall conform to IS 2062.

   Perforated Type (Straight run/ Bend/Tee)
   Different sizes (as per schedule of quantities) perforated type cable tray construction similar to `2' above but in perforated sheet. Minimum sheet thickness shall be 2mm and perforation size shall be as per standard prevailing practice.

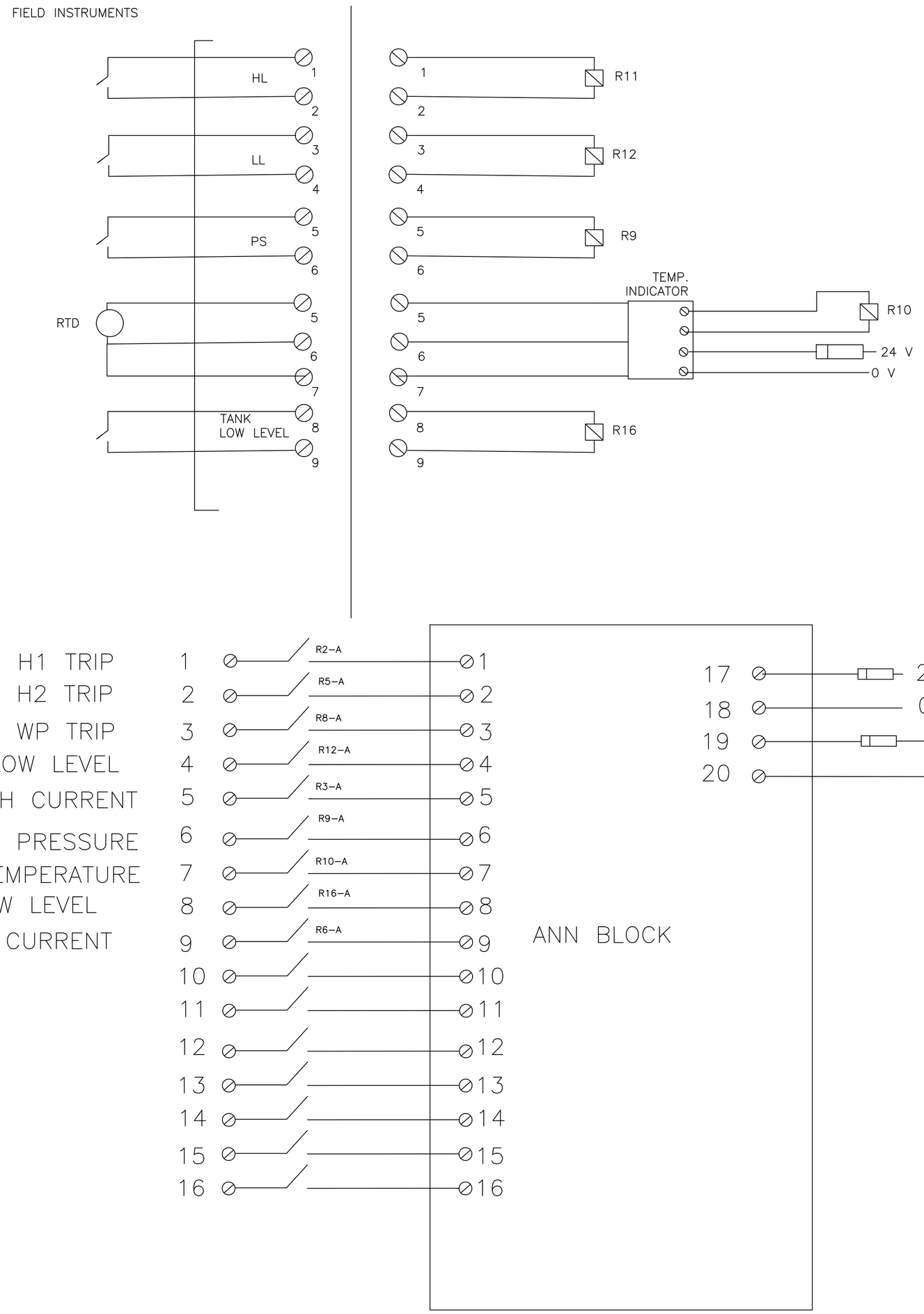
   Galvanizing: -
   Hot dip galvanized (Galvanized thickness minimum 86 micron) after fabrication with hot dipped GI coupler plates and M8 x 20mm M.S. electrogalvanised hardware for jointing the two lengths of trays. Galvanizing shall conform to IS 2629.

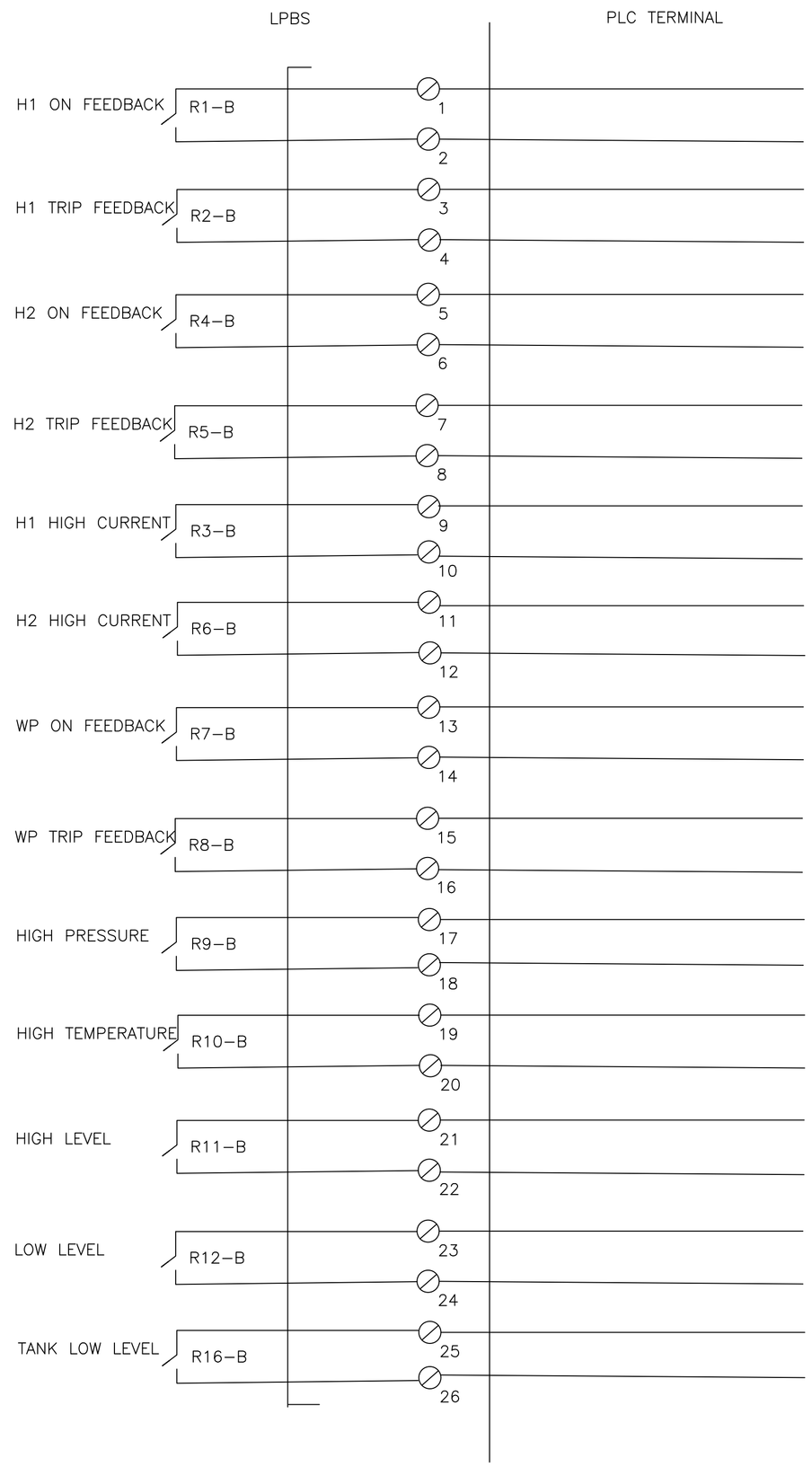
3 Accessories
   All accessories for joining trays shall be compatible to tray specifications for correct interfacing and with matching dimensions. Tray bend will be calculated as the running meter.

4. Installation
   Cable trays are to be installed overground through M.S. rods/angles, the Contractor will do all necessary arrangement at their end free of cost regarding Welding, Gas cutting works etc. whenever required for installation of M.S. supports with fixing clamps in multi-tier formation leaving clear distance between two tiers approx. 300 mm with all the coupling plates, nuts, bolts etc. as required for jointing the 2 standard lengths are in scope of this item.
   To make the Bend, Tee, riser from existing cable tray by cutting and welding is in the scope of this item only. After welding zinc coating spray shall be applied on the bend and tee etc.
   MS angle will be supplied by dept. All the MS item primer coating and painting is in the scope of the vendor. Zn coating spray will be given in welded portion

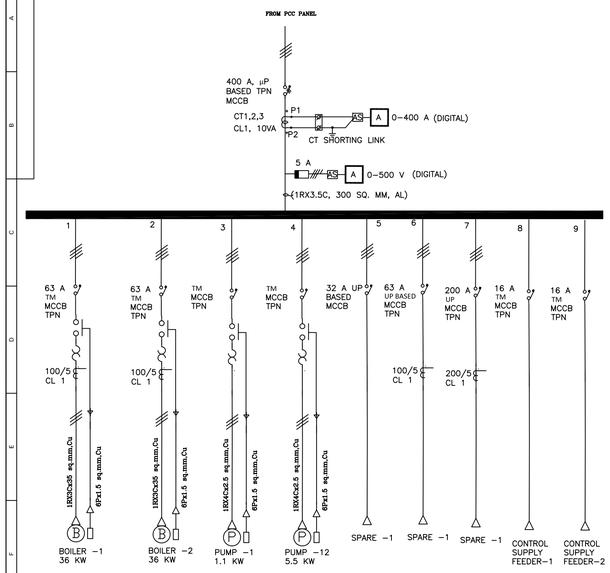


DRAWING NAME:	BOILER CONTROL PANEL DIGRAM (1 OF 2)
DRAWING NO:	DD/2
PROJECT:	



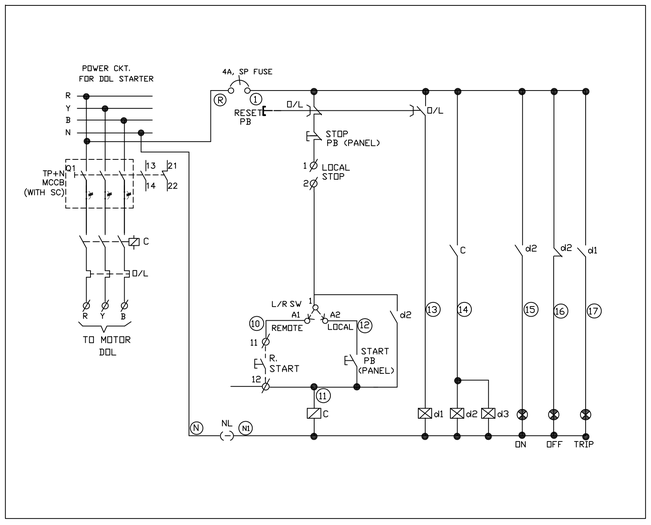


DRAWING NAME:	BOILER CONTROL PANEL DIGRAM (2 OF 2)
DRAWING NO:	DD/3
PROJECT:	

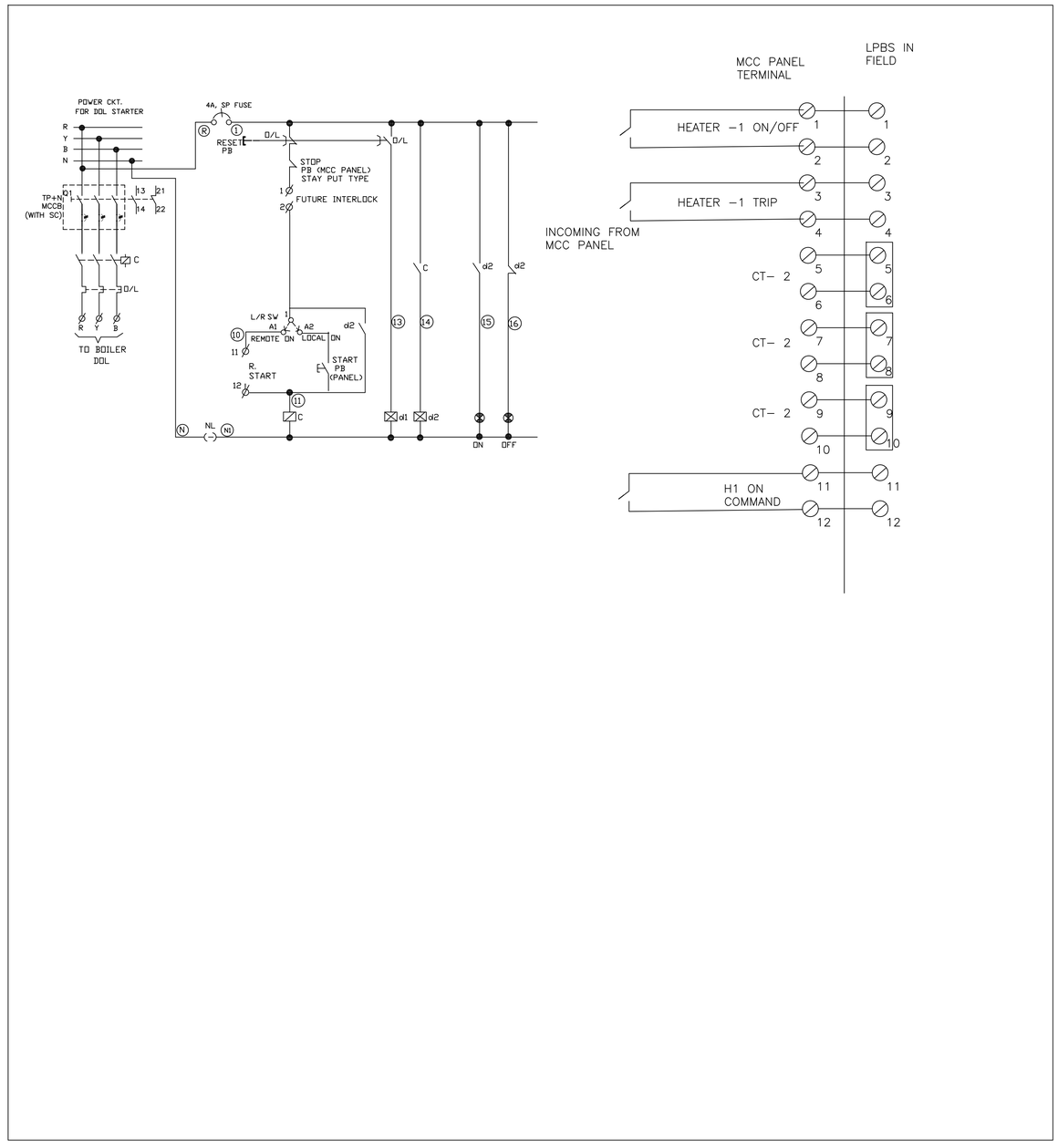


NOTES.

1. THE CONSTRUCTION OF SWITCHGEAR PANEL SHALL BE EXTENDIBLE.
2. METERS, INDICATING LAMPS SHALL BE FLUSH MOUNTING TYPE ON FRONT DOOR/COVER.
3. CUBICAL PANEL SHALL BE PROVIDED WITH 5A SWITCH/SOCKET POINT WITH SEPARATE CONTROL FUSES.
4. ALL CUBICLE PANEL SHALL HAVE LIGHTING POINT CONTROLLED BY SWITCH WITH BUILT IN CHOKE PL11 WATT LAMP AND SEPARATE CONTROL FUSES.
5. BUS BARS SHALL BE OF ELECTROLYTIC COPPER, AND ALL JOINTS SHALL BE SILVER PLATED ON BOTH SIDE INCLUDING TAP OFFS.
6. ALL MATERIAL SHALL BE AS PER PREFERRED MAKE OF MATERIALS ENCLOSED IN A TENDER.
7. ALL CONTROL & CT. WIRES SHALL BE BROUGHT FIRST TO THE TERMINAL BLOCK & THEN FURTHER TO RESPECTIVE MOTORS, RELAYS, SWITCHES ETC. TO FACILITATE EASE OF MAINTENANCE AND WIRES SHALL BE COLOUR CODED.
8. ALL CONTROL TERMINALS SHALL BE OF SUITABLE RATING OF STUD TYPE (ELEMEX) AND CT'S. TERMINALS SHALL HAVE SHORTING ARRANGEMENT.
9. PAINTING OF PANEL SHALL BE DONE ON ALL SIDES INCLUDING AT JOINTS
10. WIRE MESH BARRIER DOOR REMOVABLE TYPE SHALL BE PROVIDED IN CABLE CHAMBER. BELOW THE TOP COVER.



CONTROL CIRCUIT DIAGRAM FOR FEEDER 5.5 KW DOL STARTER MOTOR



CONTROL CIRCUIT DIAGRAM FOR BOILER FEEDER (FEEDER NO 1, 2, 3)

DRAWING NAME:	MCC PANEL SLD AND CONTROL CIRCUIT DIAGRAM
DRAWING NO:	DD/1
PROJECT:	