Open RfP Notice No. RECPDCL/JKPDD/AMI/21-22/2329, dated: 06.01.2022			Date: 18.02.2022
		Amendment - 1	
S.no	Page No.	**Specifications as per RfP**	**Comments**
1	Clause No- 8. Qualification Requirements - Sub Clause - T2 - Technical Requirements	Sole/ Lead Bidder/ any other Consortium Member must have experience of integration of head-end system with MDM on standard interfaces and data exchange models for at least 30,000 consumers (cumulatively) in an Indian/ Global Utility (power/ water/ natural gas/ telecom) in the last 5 (five) years which are in operation for at least 1 (one) year. or Sole/ Lead Bidder/any other Consortium Member should have installed, integrated, tested, and commissioned control center hardware and application software for at least 60,000 endpoints (cumulatively) in an Indian/ Global Utility (power/ water/ natural gas/ telecom) in last 5 (five) years which are in operation for at least 1(one) year	Sole/ Lead Bidder/ any other Consortium Member must have experience of integration of head-end system with MDM on standard interfaces and data exchange models for at least 30,000 consumers /end points **including Feeder meter, DT Meters, Boundary meters** (cumulatively) in an Indian/ Global Utility (power/ water/ natural gas/ telecom) in the last 5 (five) years which are in operation for at least 1 (one) year. or Sole/ Lead Bidder/any other Consortium Member should have installed, integrated, tested, and commissioned control center hardware and application software for at least 60,000 endpoints (cumulatively) in an Indian/ Global Utility (power/ water/ natural gas/ telecom) in last 5 (five) years which are in operation for at least 1(one) year
2	Clause No- 8.1.1 Meter manufacturer Qualification Requirements - Sub Clause - T1 - Technical Requirements	Supporting documents:	In case of Non-Disclosure Agreement signed with the client, bidder to submit the performance certificate on client's letter head indicating details of the project/work with client's name, contact details, telephone no., contract value as a supporting document against the technical requirement.
3	Clause No- 8.1.1 Meter manufacturer Qualification Requirements - Sub Clause - T2 - Technical Requirements	Meter Manufacturer shall have manufacturing capacity of minimum of 75,000 Smart meters per month in India including its SMT PCB Assembly as well as Meter Assembly & Meter testing	Meter Manufacturer shall have manufacturing capacity of minimum of 75,000 Smart meters per month in India as well as Meter Assembly & Meter testing
4	Section 2. Eligibility Requirements Qualification Requirements /Pt T2. Technical Requirements	Addendum	In case of power distribution utility participating as System Integrator, inhouse implementation experience of integration of head-end system with MDM on standard interfaces and data exchange models for at least 30,000 consumers shall be considered
5	Section 3. Instructions to Bidders and Bid Data Sheet BDS/B. Preparation of proposals Clause 13.i. System Integration Experience	Addendum	In-house experience of the implementation agency (in its distribution licensed area) through self certification accompany by necessary regulatory approval shall be counted as a valid experience for qualifying in the bid
6	Section 2. Eligibility Requirements Clause 8.2. Clause 3	The entity claiming experience must have either executed such projects itself or must own at least 26% of the shareholding in the company that has executed the project(s) up to the date of commissioning of such project	The entity claiming experience must have either executed itself/ paid for such projects or must own at least 26% of the shareholding in the company that has executed the project(s) up to the date of commissioning of such project
7	Section 2 Clause 8.4	Addendum	For successful execution of the project, if so required, the bidder may change its OEMs meeting the Eligibility criteria as mentioned in the document, with written consent of RECPDCL.
8	Clause 8.1	Addendum	Bidder to submit the Manufacturer Authorization form as per Annexure B for proposed Smart Meter Manufacturer and RF Solution provider
9	Annexure I	Methodology of Proof of Concept The following commands shall be tested at HES: 4. 15 mins Interval data for 4 hours	4. 30 mins Interval data for 4 hours
10	Section 5, Clause E	The details quoted herein shall stand valid at least for 9 months from the date of submission of this Financial Bid and for implementation of Project, if awarded, as per the timeframe indicated in the RFP	The details quoted herein shall stand valid at least **for 6 months** from the date of submission of this Financial Bid and for implementation of Project, if awarded, as per the timeframe indicated in the RFP
11	Form14: List of Material	2:1 and 4:1 Meter Box arrangement	All meter box arrangements shall be 1:1
12	Form 20: pre-Contract Integrity Pact	7. Fall Clause 7.1 The BIDDER undertakes that it has not supplied/is not supplying similar product/systems or subsystems at a price lower than that offered in the present bid in respect of any other Ministry/Department of the Government of India or PSU and if it is found at any stage that similar product/systems or sub systems was supplied by the BIDDER to any other Ministry/Department of the Government of India or a PSU at a lower price, then that very price, with due allowance for elapsed time, will be applicable to the present case and the difference in the cost would be refunded by the BIDDER to the BUYER, if the contract has already been concluded.	7. Fall Clause: Not applicable
13	Section 4. Form 21 Section 6, Annexure A, B	Data Display Facility - Auto Scroll Mode The meter's display should return to default display mode (continues auto scroll) if push button is not operated for more than 10 seconds. (The order of display may be revised as per requirement of the RECPDCL). Meter display should go in to sleep mode during Power On condition in case the push button is not operated for more than 10 minutes	As per CEA Guidelines, 2020, Meter display **should not go in to sleep mode during Power-On condition**
14	Section 4. Form 21 Section 6, Annexure A, B	Data Display Facility - Auto Scroll Mode . Last Recharge Amount . Last Recharge Time . Total amount at last recharge . Current balance Amount . Current Balance Days Left.	Parameters display in Auto/Manual mode for prepaid meters: . Last Recharge Amount . Last Recharge Time . Total amount at last recharge . Current balance Amount **. Current balance time** **(As per CEA Guidelines, 2020)**
15	Page No. 119/ Section 5. Financial Proposal – Forms Form 21, S. No. 38	Data Display Facility - Current month MD in kVAh with legends.	Current month MD in **kVA** with legends.

16	Page No. 151/ Clause no D of Section 5	Clause D of Sec 5: Financial proposal forms stated that - "Under no circumstances shall escalation in prices of this Financial Bid be entertained by RECPDCL whether due to factors within or beyond control of the Bidding Consortium such as change in tax structure, currency value change, etc." Further, Clause no 5.3.3 of Sec 7 stated that, taxes & duties shall be dealt in line with the change in law provision, Clause 19 of Sec 7 including SCC Clause no 19.2.	Clause D of Sec 5: Under no circumstances shall escalation in prices of this Financial Bid be entertained by RECPDCL except due to factors as mentioned in Clause 5.3.3. of Section 7
17	1.2About the AMI Project and the AMI Project Area	a) The data is to be captured at a periodicity of 15 mins. The AMI system till HES thus deployed should be integrated to the Oracle MDM being deployed under the ongoing project. The bidder to provide data in the requisite format/periodicity as per the deployed solution for seamless operation of the entire system;	"The data is to be captured at a periodicity of 30 mins.The AMI system till HES thus deployed should be integrated to the Oracle MDM being deployed under the ongoing project. The bidder to provide data in the requisite format/ periodicity as per the deployed solution for seamless operation of the entire system"
18	Section 6 - Project Requirements160 of 414	Supply, installation, integration, testing and commissioning of: Reference, the Smart Meter communication,it is envisaged that plug and play type communication modules shall be deployed in the smart meter, for any given communication technology. These modules shall be field-deployable, with corresponding Communication interface modules being used in the DCU/Gateway or BTS of wide area network in accordance with the details provided in Annexure F. The General requirements for common pluggable module for smart meters as per Annexure F envisage a universal interface and a particular size irrespective of the choice of communication technology that defines the dimensions of the communication slot as well as physical placement and location of connectors. The same shall be adopted in all smart meters mandatorily for deployment w.e.f. 1 Jan 2023 or one year after BIS ertification, whichever is later, and BIS certification taken accordingly as per IS 16444 for the same.	Please refer to the amendments for Annexure F made considering the meter deployment timeline.
19	Page No. 157& 230/ Clause. No. 12 of Sec. 6	"the RECPDCL/ JKPDD shall provide necessary clearance/ approval/ permits that are to be issued by it for initial 25% of contiguous electrical locations for Smart Meter deployment along with related documentation within 6 (six) months from date of execution of this Contract."	"the RECPDCL/ JKPDD shall provide necessary clearance/ approval/ permits that are to be issued by it for initial 25% of contiguous electrical locations for Smart Meter deployment along with related documentation within **3 (Three)** months from date of execution of this Contract."
20	Section 6 Clause 2.2 Pg. No.160-161	The communication infrastructure shall be 90% RF based and 10% Cellular/GPRS based with 100% variation provision.	Section 6, Clause 2.2 - The communication infrastructure shall be 90% RF based and 10% Cellular/GPRS based i.e 4G with fallback 2G with 100% variation provision in qty of Cellular based meters.
21	Section 6 Annexure A	▪ Scroll with Push-button All Parameters mentioned under Auto-Scroll mode should be displayed. Additionally, the following Parameters shall also be displayed: • Internal diagnostics (display check)	Additional Parameters: Internal Diagnostics **DELETED**
22	Section 6 Annexure B	The display parameters shall be: ▪ Auto Scroll - Instantaneous average Power Factor	The display parameters shall be: ▪ Auto Scroll - Instantaneous Power Factor
23	Section 6 Annexure B	▪ Scroll with Push-button All Parameters mentioned under Auto-Scroll mode should be displayed. Additionally, the following Parameters shall also be displayed: • Internal diagnostics (display check)	Additional Parameters: Internal Diagnostics **DELETED**
24	Section 6 Annexure A	Further, the Meter should display high resolution energy values with resolution of 2 digits before decimal and 3 digits after decimal in push button mode.	Further, the Meter should display High Resolution energy values with resolution of 3 digits before decimal and 2 digits after decimal in push button mode.(as per CEA guidelines)
25	Annexure C	Time of Use (In case of net-meter both export & import parameters to be measured) : As per IS 15959: Part 3 (as applicable)	Parameters as per Table 4 of IS15959 part 3
26	Annexure C	Data display facility(manual/Auto): Display of data as per IS 16444 (Part 2)	Parameters mentioned in Annexure D.
27	Annexure R 5.4. OUTER SHEATH Pg. No.285	The outer sheath shall consist of type ST-2 XLPE Compound conforming to the requirements of IS: 5831/1984.	The outer sheath shall consist of type **ST-2 PVC** Compound conforming to the requirements of IS: 5831/1984.
28	Annexure R Clause 1. Scope Pg. 299	Annexure R: ……..compact aluminum conductor, with XLPE insulated, PVC inner sheathed, galvanized steel strip unarmoured..	……..compact aluminum conductor, with XLPE insulated, PVC inner sheathed, unarmoured...
29	Annexure O: Clause 1.2 (vi) " General Constructions"	Suitable circular holes shall be provided at the bottom of the cupboard for inlet & outlet cables with glands of size 15/16mm suitable for 2 core armored aluminum cable(s) up to 6 Sq.mm made of engineering plastic for the cable securely fixed to the bottom of the meter box on both sides by chuck-nuts	Suitable circular holes shall be provided at the bottom of the cupboard for inlet & outlet cables with glands of size 15/16mm suitable for 2 core armored aluminum cable(s) and for three phase meter, the internal gland diameter shall be 22-26mm made of engineering plastic for the cable securely fixed to the bottom of the meter box on both sides by chuck-nuts/
30	Additional	i) Technical Specification for SMC Main Service Distribution Box (MSDB@30% of total required qty. considering existing boxes installed. ii) Technical Specification for Mini- Wedge Connectors. iii) Technical Specification for Service Main Clamps for supporting cable from Meter to Consumer. iv) Technical Specification for Lugs for cable installation from MSDB to Meter and Meter to Consumer (for 1 Phase Connection), 3 Phase Connection and DTs	Please refer Annexure C
31	Clause 14.1 pg. 376	Change Notes / Change Order to Alter Number of Meters to be Installed Necessity of Change Notes arise due to more meters getting added over and above the numbers agreed for the project, subject to the variance limit of specified in SCC, as percentage of the number of meters decided. Negative variation is permissible only up to the "Installation Milestone". Positive variation is however possible at any time during the Contract Period	The price variation for Service Cables and DT Cables shall be as per Annexure A.

32	Page No. 353/ Clause no 7.1 of Sec 7	Except in case of Force Majeure or where the delay in delivery of the Solution is caused due to any delay or default of RECPDCL/JKPDD if the Installation Milestone is delayed by from the date of execution of the Contract the AMI-IA shall be liable to pay liquidated damages as per the rates specified in this Article.	Except in case of Force Majeure or where the delay in delivery of the Solution is caused due to any delay or default of RECPDCL/JKPDD if the Installation Milestone is delayed by **more than 12 months** from date of execution of contract, the AMI-IA shall be liable to pay liquidated damages as per the rates specified in this Article.
33	Part-II Pg. 255	In the event of PLC communication being chosen as the only or one of the choices…….. connector and pinout arrangement for communication module arrangement	Part - II AC Power Interface: Not Applicable
34	Annexure F: General requirement for common pluggable communication module for Smart Meters	4. A transparent cover may be used for the purpose, a. To have a sealing arrangement with the meter body as well as b. For easy viewing of LED indicators and antenna assembly without having to open the cover.	The NIC body can be transparent/Opaque. However, the indicators for Tx/Rx should be clearly visible either through LED or icon on Meter Display.
35	Annexure F: General requirement for common pluggable communication module for Smart Meters	Communication interface: The meter shall have a slot of an appropriate size to allow for the pluggable communication module (such as but not limited to NAN /WAN, dual mode RF, Dual Technology, cellular etc.) to be fit in to the meter. The meter shall provide a 14-pins Female socket connector (2*7pin, 2.54mm). The socket shall be selected and positioned to ensure that the male pins on the communication module can connect reliably and easily connect with the female contactors on the meter.	Agreed
36	Section 2.3 Head End System (HES)	b. 15 mins interval meter reads c. 50,000 users requesting data from meters	b. 30 mins interval meter reads c. 50 users requesting data from meters concurrently Annual Consumer growth rate can be considered as that of National Standard of 7%.
37	General	Operation voltage on site	The operation voltage may fall upto 120V during winter conditions. Meter manufacturer to explain behavious of meter below 120V.
38	7.7 Service Level Agreement (SLA)Page-199	Remotely top-up amount (for pre-paid application only) Delivery of top up amount/ credit recharge in case of prepayment post successful transaction from payment gateway up to consumer interface	Remotely top-up amount (for pre-paid application only) : NA
39	Section 7 Clause 5.2.7.	Payment Security Mechanism Clause No. 5.2.7 – Payment Mechanism: RECPDCL shall, within 90 (ninety) days from the date of execution of Contract, establish a Direct Debit Facility for the entire online consumer payments to ensure recovery of the amount due to be paid to the AMI-IA including amount due to be paid towards supplementary invoice. In this regard, RECPDCL shall create a separate facility for receipt of payment from JPDCL and KPDCL. This facility shall be configurable for direct debit of 100% (hundred percent) of the monthly payment due to the AMIIA.	"RECPDCL shall, within 90 (ninety) days from the date of execution of Contract, establish a "Direct Debit Facility (DDF)" to ensure recovery of the amount due to be paid to the AMI-IA including amount due to be paid towards supplementary invoice. In this regard, RECPDCL shall create a dedicated account for receipt of payment from JPDCL and KPDCL. The DDF for payments to AMI-IA shall be created on this dedicated account. In case of delay in establishment of DDF mechanism by JPDCL/KPDCL to RECPDCL, JPDCL/KPDCL shall provide an interim payment security to RECPDCL in form an unconditional, irrevocable and revolving LC within 90 (ninety) days from the date of execution of Contract for an amount due to be paid to RECPDCL for 90 (ninety) days till establishment of Direct Debit Facility in all respects."
40		Clause No. 11.2.1 (a) – RECPDCL Event of Default	Failure of RECPDCL to establish Direct Debit Facility or pay the Monthly amount due to be paid including amount due towards supplementary invoice in accordance with Article 5.2 or any other payment due from Utility under the Contract and more than 90 (ninety) days have elapsed since such payments became done.
41	Section 7, SCC 6.1 Performance Security	5% of the Contract Price	3% of the Contract Price
42	Section 7. Clauses 11.5.4 Page- 365	a) The present value of the receivables for the AMI system installed shall be calculated by multiplying the outstanding meter-months of operating the AMI system with percentage of total meters installed, integrated and operationalized as on the date of termination, and AMI Service Charge, and discounting the same as on date of termination at the percentage specified in SCC ("Present Value"). SCC - 12%	SCC 11.5.4 (a) 10.5%
43	Section 5 Financial Bid secion B Line item 3.10 for Lot A and Lot B	**Unit in Nos.**	**Unit in Set**

44	Section 6, Clause 1.17	Addendum	In order to properly carry out analysis of delay in execition of contract/project, it is imperative that a date wise record of various activties right from award of contract to completion of works/supply ismeticulously and systemeatically maintained by concerned departments in respect of areas under their responsibility. In line with the above, it shall be ensured by the concerned officer of RECPDCL, that the following details are maintained: 1. Detailed Engineering Records: These shall include reciept of derawings/design calculations/other technical details from the contractor and its approval by RECPDCL, Type tests, Approval of Sub-contractor/vendor involving QR etc. and intermediate relevant activity. 2. Quality Assurance and Inspection records: These shall include approval of sub-contractor of Non-QR items, approval of Quality plan of Different manufacturers, Inspection of material including issuance of MICC based on Inspection call recieved from Contractor etc.(Responsibility: Quality Assurance Team of RECPDCL and AMI-IA) 3. Site Execution Records: Execution site shall ensure that hindrance register is maintained and entries are made therein on daily basis. The hindrance register should record all the hindrances in scheduled progress of work, such as delay in release in fronts due to non completion of work by another agency doing associated work, delay in supply of infrastructure, facilities by 'Owner' as per contract, delay in receipt of material, delay in deployment of trained/adequate manpower, nonavailability of site engineer/project in charge of contractor etc, apart from the day-to-day delay. These records also shall be reviewed during the fortnightly review of the progress of work by the concerned Officer, RECPDCL/JKPDD and corrective measures shall be taken. Moreover, the entries/records in the register will be used/referred while analyzing LD cases/arbitration cases/other claims of the contractor.

Annexure A - Price variation for Service Cables & DT Cables:

The price adjustment on the Ex-works price component, less advance, of Cables shall be as follows:

Terms used in price variation formula :
P = Price payable as adjusted in accordance with the appropriate formula (in Rs/km)
Po = Price quoted/confirmed (in Rs/km)

Aluminium

AIF = Variation factor in Aluminium (as published by IEEMA)
Al = Price of EC grade aluminium rods (Properzi rods) (as published by IEEMA). This price is as applicable on the first working day of the month, one month prior to the date of delivery.
Alo = Price of EC grade aluminium rods (Properzi rods) (as published by IEEMA). This price is as applicable on the first working day of the month, one month prior to the date of tendering.

PVC Compound Polymer

Cc = Price of PVC compound (as published by IEEMA). This price is as applicable on the first working day of the month, one month prior to the date of delivery.
Cco = Price of PVC compound (as published by IEEMA). This price is as applicable on the first working day of the month, one month prior to the date of tendering.
CCFAl = Variation factor for PVC Compound/ Polymer for aluminium conductor cable (as published by IEEMA)
CCFCu = Variation factor for PVC Compound/ Polymer for copper conductor cable (as published by IEEMA)

The prices and indices mentioned above are published by IEEMA vide circular reference IEEMA(PVC)/Cable/--/-- prevailing as on 1st working day of the month i.e one month prior to the date of tendering.

Price variation formulae for Power Cables

A. Aluminium conductor PVC insulated 1.1kV power cables

P=Po + AlF (AL – Alo) + CCFAl (CC – Cco) + FeF (Fe – Feo)

For unarmoured multicore cables (without steel armour); FeF = 0

D. Aluminium conductor XLPE insulated 1.1kV power cables

P = Po + AlF (AL – Alo) + CCFAl (CC – Cco) + FeF (Fe – Feo)

For unarmoured cables; FeF = 0

For steel armoured cables; AlF = 0

For aluminium armoured cables ; FeF = 0

For unarmoured cables ; FeF, AlF = 0

G. For Aluminium conductor XLPE insulated 3.3 to 33kV power cables

P = Po + AlF (Al -Alo) + CCFAl (Cc – Cco) + FeF (Fe – Feo)

For unarmoured multicore cables (without steel armour); FeF = 0

Note : In case of any clarifications in the above formula kindly refer the IEEMA price variation formula given in circular IEEMA/PVC/CABLE/2007 effective from 1st January 2007, In case of any discrepancies the IEEMA circular mentioned shall prevail.

Annexure B - Appointment of Advanced Metering Infrastructure (AMI)-Implementing Agency for Smart Metering for 6.00 Lacs Consumers in UT of Jammu & Kashmir on DBFOOT Basis

(Manufacturer's Authorization Form)
(On Manufacturer's Letterhead,

To,

Dear Ladies and/or Gentlemen,

WE [insert: name of Manufacturer] who are established and reputable manufacturers of [insert: name and/or description of the plant & equipment] having production facilities at [insert: address of factory] do hereby authorize [insert: name & address of Bidder] (hereinafter, the "Bidder") to submit a bid, and subsequently negotiate and sign the Contract with you against IFB [insert: title and reference number of Invitation for Bids] including the above plant & equipment or other goods produced by us.

We hereby extend our full guarantee and warranty for the above specified plant & equipment materials or other goods offered supporting the supply, installation and achieving of Operational Acceptance of the plant by the Bidder against these Bidding Documents, and duly authorize said Bidder to act on our behalf in fulfilling these guarantee and warranty obligations. We also hereby declare that we and ……, [insert: name of the Bidder] have entered into a formal relationship in which, during the duration of the Contract (including warranty / defects liability) we, the Manufacturer or Producer, will make our technical and engineering staff fully available to the technical and engineering staff of the successful Bidder to assist that Bidder, on a reasonable and best effort basis, in the performance of all its obligations to the Purchaser under the Contract.

For and on behalf of the Manufacturer

Signed: _____

Date: _____

In the capacity of [insert: title of position or other appropriate designation] and this should be signed by a person having the power of attorney to legal bind the manufacturer.

Date:.....

Place:..... (Signature).....

(Printed Name).....
(Designation).....
(Common seal)…….....

Specification of Cable Gland & Lugs:

Cable Glands and Lugs Cable glands shall be Double compression type, tinned/Nickel plated (coating thickness not less than 20 microns in case of tin and 10 to 15 microns in case of nickel) brass cable glands for all power and control cables. They shall provide dust and weather proof terminations.

They shall comprise of heavy duty brass casting, machine finished and tinned to avoid corrosion and oxidation. Rubber components used in cable glands shall be neoprene and of tested quality. Required number of packing glands to close unused openings in gland plates shall also be provided. The cable glands shall be tested as per BS: 6121.

The cable glands shall also be duly tested for dust proof and weather proof termination. Cables lugs shall be tinned copper solder less crimping type conforming to IS: 8309 and 8394 suitable for aluminum or copper conductor (as applicable). The cable lugs shall suit the type of terminals provided. The cable lugs shall be of Dowell make or equivalent.

TECHNICAL SPECIFICATION
FOR
SUPPLY OF
WEDGE CONNECTOR
TO BE USED IN
POWER DISTRIBUTION SYSTEM

:: TECHNICAL SPECIFICATIONS::

Sr. No	Technical Specification No./Revision	Date of revision
1.		
2.		
3.		

I N D E X

1. **SCOPE:**

This specification provides for design, manufacture, testing, inspection, packing and dispatch at destination the Wedge connectors specified herein for their satisfactory performance on various power distribution lines. The wedge connector is suitable for Weasel, Rabbit and Dog conductors. Fitting shall confirm all respect to the highest standard of engineering, design and workmanship and shall be capable of performing trouble free continuous operation.

Wedge connector must be used for line jumpers, cut-points, making connection to the equipment's like CTs and PTs, Lightning Arresters, DTC etc. The equipment required shall be complete with all components which are necessary or usual for their efficient performance for a longer time and satisfactory maintenance.

2. **APPLICABLE STANDARDS:**

The Wedge connector shall conform to the following International/Indian Standards, which shall mean latest revisions, with amendments/changes adopted and published, unless specifically stated otherwise in the Specification.

In the event of the supply of connector conforming to standards other than specified, the Bidder shall confirm in his bid that these standards are equivalent to those specified. In case of award, salient features of comparison between the standards proposed by the Supplier and those specified in this document will be provided by the Supplier to establish their equivalence.

Sl. No.	International /Indian Standard	Title
1.	IS 2121	Fittings for aluminum and steel covered aluminum conductors for overhead lines
2.	IS 5561	Electrical Power Connectors
3.	ANSI C 119.4-2004 ASTM D 117 UPDATED	
4.	IS 6009 (1970 UPDATED)	Method for evaluation of results of accelerated corrosion test

3. **Service Conditions**

The overall climate is moderate hot, humid, tropical, highly polluted and conductive to

rust and fungus growth. The clamps/connector shall be given tropical and fungicidal treatment and shall be capable of satisfactory operation under the hot and humid climatic conditions that would prevail at sites. The climatic conditions are prone to wide range of variation in ambient conditions. The materials offered shall be suitable for installation at any of the Electricity Distribution network in Gujarat State.

3.1	Maximum Ambient Temperature (^{o}C)	50
3.2	Relative humidity (%)	10 to 100
3.3	Maximum Annual Rainfall (mm)	1450
3.4	Maximum Wind Pressure (Kg/mm^2)	150
3.5	Maximum Altitude above mean sea level (Meter)	1000
3.6	Isoceraunic Level (days/year)	50
3.7	Seismic Level (Horizontal acceleration)	0.3 g
3.8	Ground Temperature (^{o}C)	30
3.9	Thermal Resistivity of Soil (deg. C cm/Watt)	150
3.10	Moderate hot and humid tropical climate, Conducive To rust and fungus growth	

4. **SYSTEM <u>PARTICULARS:</u>**

4.1.	Nominal System Voltage	11 KV
4.2.	Highest System Voltage	12 KV
4.3.	Short circuit level for 3 sec	20KA
4.4.	Frequency	50 Hz
4.5.	Basic insulation level	75 KV (1.2/50 Micro second wave)
4.6.	Numbers of Phases	3
4.7.	System of Earthing	Effectively Earthed

5. **Vander Registration:** The vender registered in GUVNL or its any subsidiary for supply of clamps and connectors of any size shall be entitled for bid submission. Proof of vender registration shall be submitted along with the bid.

6. **Terms and Conditions of supply:** The Commercial terms and conditions of GUVNL for supply of material shall be applied.

7. **General Technical Requirements of Connectors**
   - 7.1. It consists of a spring "C" member and a Wedge, both made from Aluminum Alloy of high ductility and electrical conductivity (Minimum 85% aluminum) and Configuration that creates spring action and electrical conductivity.
   - 7.2. The connector shall be useful for the conductor size as mentioned in this Specification.
   - 7.3. The connectors could be possible to install with standard tools available in the market or with the help of hammer.

7.4. The “C” wedge connectors shall be of universal type facilitating to take horizontal or vertical jumps.
7.5. The material used shall be specially designed with close tolerances on the chemical composition to ensure consistency of the “C” member production regarding dimensions and mechanical properties.
7.6. The “C” member shall have suitable elastic properties to accommodate the variations in conductor dimensions due to thermal effects
7.7. The dimensions for the wedges are manufactured to close tolerances to ensure repeatability and reliability of the connection.
7.8. All casting shall be free from shrinking, blow holes, surface blisters, cavities, cracks, other defects and quality of product shall be uniform throughout. All sharp edges and corners shall be blurred and rounded off.
7.9. Assembly shall be designed and manufactured in such a way so as to have minimum contact resistance.
7.10. The fittings offered shall be inherently resistive to atmospheric corrosion or be suitable to protect against corrosion both during storage as well as in service.
7.11. The clamps shall have suitable locking arrangements to safe guard against vibration and loosening.
7.12. No part of a clamp shall be less than 5 mm thick for fittings suitable up to size of rabbit conductor, No part of a clamp shall be less than 7 mm thick for fittings suitable for Dog conductor
7.13. Connectors shall be designed to be corona free in accordance with the requirements stipulated in IS: 5561
7.14. The terminal connector for equipment’s shall be suitable for single Weasel/Rabbit/Dog conductor for 11 KV.
7.15. The clamps/connector shall not cause any damage to the conductor in any way.
7.16. The connector for connecting solid/ stranded conductor shall be suitable for use on any of the following combination:

AAAC TO AAAC

ACSR TO ACSR

7.17. It shall be pre-coated with corrosion inhibitor compound.
7.18. It shall be coated with a conductive inhibitor containing abrasive particles to help in cleaning the contact surface during installation. The coating shall be done at factory itself.
7.19. At the end of wedge notch type locking facility shall be provided. This will ensure once the wedge is fixed it will not loosen and come back.
7.20. The wedge connector shall be designed to withstand the flow of continuous minimum current as follows:

1. Weasel 200 Amp
2. Rabbit 300 Amp

3. Dog 400 Amp

7.21. The temperature rise when carrying full load current shall not exceed 45. ^{o}C above site ambient temperature of 40. C. The rated current for which the clamp connectors are designed with respect to the specified ambient temperature shall be marked on each component of clamps and connectors.

a. "C" member

The "C" member shall be formed from extruded aluminum alloy so that the grain (extrusion direction) runs perpendicular to the conductor. (e.g from C-groove end to C- groove end)

The material used shall be specially designed with tighter tolerance on the chemical composition to ensure consistency of the C-member production regarding dimension and mechanical properties.

b. Wedge

The dimension for the wedge shall be manufactured to close tolerance to ensure repeatability and reliability of the connection.

c. Inhibitor

An oxidation inhibitor shall be applied to the surface there by elimination of oxidation of metallic surface. The chemical composition of the inhibitor shall be synthetic and compatible with the rubber gloves used by the utilities. This inhibitor shall contain special aluminum abrasive particles, optimized in size and quantity, to ensure repeatability and reliability of the electrical contact made in every connection.

d. Installation tool

Installation tool is to be used for wedge connectors' installation, due to which operator dependency and human errors in connector installation shall be eliminated. This tool shall ensure speed of wedge insertion at approx. 35-40 m/s which is important requirement for connector performance. The said tool can be supplied as an optional tool. It will not be a part of the price bid.

8. **Freedom from Defect:**

The wedge type connectors shall be smooth and free from cavities, blow holes, and such other defects, which would likely cause them to be unsatisfactory in service.

The wedge type connectors shall be so designed and proportioned that they are capable of safely withstanding stresses to which they may be subjected (including

those due to short circuit and climate conditions) and that the effects of vibration both on conductor and connector are minimized. They shall be designed, manufactured and finished so as to avoid sharp radius of curvature, ridges and excrescences, which might lead to, localized pressure on or damage to the conductor in service.

9. Test

Individual fittings, clamps, connectors shall be subjected to following type tests, acceptance test and routine test.

9.1 Type Test

a. Tensile Test

b. Resistance Test

c. Temperature rise Test

d. Short Time current Test

e. Dimension Check

f. Current Cycle Test (ANSI 119.4 updated) as per the connector class.

h. Corrosion test/Salt spray test (IS 6009 (1970 updated /ASTM –D- 117 (annexure A updated)

9.2 Acceptance Test

a. Tensile Test

b. Resistance Test

c. Dimension Check

9.3 Routine Test

a. Visual Inspection

b. Dimension Check

9.4 Testing Certificate

The bidder shall furnish detailed type test reports of the offered Wedge Type Connector for the tests as per this specification. All the above Type Tests shall be carried out as per the relevant standards at laboratories which are accredited by the National Accreditation Board of Testing and Calibration Laboratories (NABL) of Government of India to prove that the Wedge Type Connector offered meet

the requirements of the specification. These type tests should have been carried out within five years prior to the date of opening of this tender.

9.5 Testing Equipment's and its facility

The following additional facilities shall be available at Supplier's works: -

9.5.1 Test Laboratory for Routine and Acceptance test shall be available at manufacturer's works and should be NABL approved.

9.5.2 Calibration Reports from Government approved testing laboratory/NABL accredited Lab of various testing and measuring equipment including tensile testing machine, resistance measurement facilities, burette, thermometer, barometer etc.

9.5.3 Standard resistance for calibration of resistance bridges.

9.5.4 The bidder should have all the routine and acceptance testing facilities, in house.

9.6 Additional Test

The DISCOM reserves the right of getting done any other test(s) of reasonable nature carried out at Supplier's premises, at site, or in any other place in addition to the aforesaid type, acceptance and routine tests to satisfy himself that the material comply with the specifications. In such case all the expenses will be to Suppliers account.

10. **Drawings and sample:**

The bidder shall submit their drawings and minimum 3 Nos of free samples of the tendered item along with the bid. The acceptability of the bid shall be subject to confirmation of type tests as mentioned above on samples carried out in any government approved NABL lab. The price bid of the bidder whose sample does not confirm any of the type test shall not be opened.

11. **<u>QUALITY ASSURANCE PLAN</u>**

11.1 The bidder shall invariably furnish following information along with his offer, failing which his offer shall be rejected.

a. Statement giving list of important raw materials names of sub suppliers for the raw materials, list of standards according to which the raw materials are tested, list of tests normally carried out on raw materials in presence of supplier's representative and as routine and / or acceptance during production and on finished goods, copies of test certificates.

b. Information and copies of test certificates in respect of bought out accessories.

c. List of manufacturing facilities available.

d. Level of automation achieved and list of areas where manual processing exists.

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

f. List of testing equipment available with the Supplier for final

g. Testing of Conductor specified. In the case if the suppliers does not possess all the Routine and Acceptance testing facilities the tender will be rejected.

h. The DISCOM reserves the right for factory inspection to verify the facts quoted in the offer. If any of the facts are found to be misleading or incorrect the offer of that Bidder will be out rightly rejected and he may be black listed.

i. Special features provided to make it maintenance free.

11.2 The bidder shall also submit following information to the purchaser along with the technical Bid.

a. List of raw materials as well as bought out accessories, and the name of suppliers of raw materials as well as bought out accessories.

b. Type test certificates of the raw material and bought out accessories.

c. Quality assurance plan (QAP) withhold points for purchaser's inspection.

11.3 The Supplier shall submit the routine test certificates of all the bought out items, accessories etc.

12. **DOCUMENTATION**

12.1 Two sets of type test reports, duly approved by the Purchaser shall be submitted by the Supplier, before commencement of supply. A copy of acceptance and routine test certificates, duly approved by the purchaser shall accompany the dispatch consignment.

12.2 The manufacturing of the connector shall be strictly in accordance with the approved drawings and no deviation shall be permitted without the written

approval of the Purchaser. All manufacturing work in connection with the connector prior to the approval of the drawing shall be at supplier's risk.

12.3 Approval of drawing etc. by the purchaser shall not relieve the Supplier of his responsibility and liability for ensuring correctness and correct interpretation of the latest revision of applicable standards, rules and codes of practices. The connector shall conform in all respects to high standards of engineering, design, workmanship and latest revisions of relevant standards at the time of ordering and purchaser shall have the power to reject any work or material which in his judgement is not in full accordance therewith.

13. Marking

Each "C" member and wedge shall be marked with distinct identification code. This identification code is also marked on the packing to ensure that the correct parts are used for the application. Thereby installer can make a quick before installing.

14. Packing

For Packing, suitable materials shall be used. The packing shall be fit to withstand rough handling during transit and storage at destination. The heads and threaded portion of fasteners fitting if any should be properly protected against damage. The gross weight of the packing shall not exceed 50 kg per box or case. All different fitting components shall be packed in different cases and shall be completed with minor accessories fitted in places. The bidder should be approved the packing list before dispatching the material.

15. Guaranteed Technical particular

GTP of Wedge Connector shall be as per specification. Any deviation w.r.to this specification shall be clearly mentioned. GTP of Wedge connector are as under.

GUARANTED TECHNICAL PARTICUALRS

"C" Type wedge connector

1	Bidder's name	As per Specifications	As offered
2	Address		
3	Wedge Connector installation tool	Optional	
4	Standard Applicable	As mentioned in tender	
5	Material of Wedge connector (Minimum 85% aluminum) a) "C" Member b) Wedge Member c) Inhibitor	Aluminum – min 82- 87% Silicon – min 12-15% And etc.	
6	Connector suitable for conductor size	Weasel (34mm²) Rabbit(55mm²) DOG (100mm²)	
8	Notch at the end of Wedge after installation	As mentioned in tender	
9	Rated current	Weasel: 200 Amp Rabbit : 300 Amp Dog: 400 Amp	
10	Wedge connector Resistance value	0.0001 Ohm (Maximum)	
13	Corrosion Resistance	As minimum as per IS	
14	Packing	As mentioned in tender	

Annexure C - 3

TECHNICAL SPECIFICATION FOR DISTRIBUTION BOX

1. SCOPE

This specification covers the technical requirements of the design, engineering, manufacturing, testing at manufacturer's works, packing, forwarding and supply of Single/Three phase LT Distribution Box complete with all accessories for efficient and trouble free operation at the site.

2. APPLICABLE STANDARDS:

The equipment covered by this specification shall conform to the requirements stated in latest edition of relevant IS/IEC/ other applicable standards and shall conform to the statutory authorities.

Sr. No	IS/IEC	Particulars
1	IS14772- 2000	General requirements for enclosures for accessories for household and similar fixed electrical installations specification
2	IS 8623-1993 Part 1 & 2	Specification for low-voltage switchgear and control gear Assemblies Part 2 Particular requirements for busbar trunking systems.
3	IS 11731-1986	Methods of test for determination of Flammability of solid Electrical insulating materials when exposed to an igniting source
4	IS 11000-1984	Fire hazard testing
5	IS 13411-1992	Glass Reinforced polyester dough moulding Compounds
6	IS 4247	Test for Non Ignitable and Self Extinguishing Properties of Solid . Electrical insulating Material
7	IS 4249	Classification and methods of tests for non-ignitabte and self-extinguishing properties of solid electrical insulating materials
8	IS 2500-2000	Sampling Procedure for Inspection by Attributes
9	IEC 60695	Glow Wire Test at 960 Deg. C
10	UL 94	Tests for Flammability of Plastic Materials
11	UL 746-C	Polymeric Materials in Electrical equipment’s
12	UL 1059	Terminal blocks up to 1500V
13	IEC 61238-1:2003	Compression and Mechanical connectors for Power cable part 1: Test methods and requirements

3. CLIMATIC CONDITIONS OF THE INSTALLATION:

a) Max. Ambient Temperature : 50 deg C
b) Max. Daily average ambient temp : 40 deg C
c) Min Ambient Temp : -15 deg C
d) Maximum Humidity : 95%
e) Minimum Humidity : 10%
f) Average No. of thunderstorm days per annum : 50
g) Average Annual Rainfall : 750 mm
h) Average No. of rainy days per annum : 60
i) Rainy months : June to Oct.

The atmosphere is generally laden with mild acid and dust in suspension during the dry months and is subjected to fog in cold months. The design of equipment and accessories shall be suitable to withstand seismic forces corresponding to an acceleration of 0.1g.

4. GENERAL TECHNICAL REQUIREMENTS:

S. No	DESCRIPTION	REQUIREMENT
1	Type of Box	Three phase, Four wire, 10 Ways
2	Application	Outdoor
3	No. of Incoming	1
4	No. of Outgoing	9
5	Incoming cable size	4C X 50 sq mm XLPE armoured
6	Outgoing cable size	2Cx10/ 2Cx16 sq mm -8 Nos & 4Cx25 Sq mm -1 No XLPE armoured, 1.1kV
7	Degree of Protection	IP 55
8	Dielectric withstand for the box	5kV for 1 min
9	Flammability requirement	FVo
10	Gaskets	Ethylene-Propylene-Diene Rubber
11	Bus Bar	
11.1	Rated voltage	415V
11.2	System frequency	50 Hz
11.3	Rated current of the each Bus bar	200 A
11.4	Number of Bus Bar Sets	5 (Three phase, Two Neutral)
11.5	Bus Bar Material	aluminium & tinned copper alloy
11.6	Current Density (Max.)	2.5 Amp/Sq.mm
11.7	Temperature rise	Maximum permissible temperature rise above ambient for the busbar and terminals shall be 45 ^{0}C at rated load.
11.8	Short Time withstand current for bus bar	3kA for 1 sec
11.9	Number of Terminals	4 Working + 1 Spare for Phases and 8 Nos each for Neutral Busbar
12	Cable Entry arrangement	Bottom side of the box

5. GENERAL CONSTRUCTIONS

5.1 Enclosure

The enclosure shall be weather proof, tamper proof and shall be made of injection moulded reinforced polycarbonate material with FVo fire retardant, self-extinguishing, UV stabilize, recyclable and Anti oxidation properties with minimum 2mm of thickness. The enclosure shall be of adequate strength, unbreakable and shall be made in two piece (base and cover). The enclosure and cover shall be dark grey colour. Enclosures cover shall open by 180 degree on the top of the enclosure and a suitable supporting latch shall be provided at the outer side of the box to hold cover when it is in fully open condition. In the joints, fixed parts shall be properly riveted to the cover base and cylindrical play shall be provided on the cover to ensure smooth opening of the boxes. The Incoming and Outgoing cables should be connected to the bus bar using detachable Allen bolt and key. The enclosure base should have holes to accommodate incoming cables and outgoing cables with thermoplastic cable grip type glands. The outgoing holes shall be covered with caps of Polycarbonate material.

5.2 Bus Bar

The Bus bars meeting the requirement of aforesaid current rating and maximum current density shall be provided in identical pairs for Phase as well as for neutral as mentioned in specification. Polycarbonate supports suitable for fixing the busbars at base shall be provided . at the ends of Bus Bar casings. The Bus bar housings shall be arranged and mounted at a suitable stepped angle so that providing new connections is easy and can be done without much bending of the cables. The Busbar's adaptor shall be mounted through screws and further riveted. Colours of the adaptors shall be Red, Yellow and Blue for the phases and Black for Neutral. Anticorrosion compound shall be provided with each box for protecting bare aluminium conductor near contact area of terminal. Proper shorting link of appropriate rating shall be provided connecting both the busbars of the neutral.

The Busbar shall be split type as per Pt 10.4 of Cl 4.1 and the distance between the busbars shall be min 25.4 mm with the separator of FRP material.

Completely insulated Busbar for Terminations (Refer Photograph Clause 18 of this specification

The arrangement shall be completely insulated busbar with non- detachable allen screw type arrangement. The bus bar shall be Alloy of Al & Tinned Copper. The insulated bus bar connectors are covered with polycarbonate plastic material and mounted separately with the help of mounting lugs arrangement on DIN rail. There should be split bus bars connectors for multiple connections. Additional screws shall be supplied with these busbars by the bidder.

5.3 Sealing of Box

For the enclosure, the gasket shall be made up of Ethylene-Propylene-Diene Rubber and shall be provided all around the cover. The box shall be provided with a safety key made of PA 6.6 (Nylon) to ensure theft proof locking arrangement. The Key shall be identical for all the boxes. The box locking screw should be made of stainless steel or plating finished steel. Addition to lock and key arrangement the box shall be provided with two U-shaped latches of approx. size 25 mm on bottom side of the box. The latch shall be GS with minimum thickness 1.2mm. The latch shall be provided along with suitable clamp assembly in base as well as cover, such that these are fully covered by the latch after closing. The clamps along with the latch shall be provided with a sealing hole on both the sides such as top provide a thru sealing arrangement on both the corners of the door opening in the assembly.

5.4 Earthing connector

At both side of the enclosure, 5 nos Electro Galvanized Earthing connector on each side shall be provided for the incoming and outgoing cable sizes as specified in the specification. The earthing connector shall be sufficient to carry the fault current. The Cable armour shall run through cable gland upto earth earthing connector. Earthing connectors shall be provided with earthing nuts and bolt for proper connections, where the cable armouring get tighten to the earthing nuts and bolts.

5.5 Mounting Arrangement

Boxes shall be provided with mounting arrangement suitable for installation on PCC poles by using Stainless Steel Strap with 20mm x 0.7mm thickness. The arrangement shall be such that the strap runs behind the box and holds the box with pole.

In addition to the above arrangement, wall mounting arrangement shall also be provided.

6. NAME PLATE Marking

The distribution box shall be provided with weather proof sticker clearly visible and effectively secured against removal. Indelibly and distinctly marked with all essential particulars as per relevant standards along with the following.

a) Manufacturer's name
b) P.O. No. with date
c) Embossing word "PROPERTY OF CED"
d) Serial number / Batch Number
e) Voltage and Current Rating of the Bus Bar
f) Guarantee Period

7. TESTS

All routine, acceptance & type tests shall be carried out in accordance with the relevant IS/IEC. All routine & acceptance tests shall be witnessed by the purchaser/his authorized representative. All the components shall also be type tested as per the relevant standards. Following tests shall be necessarily conducted on the LT Distribution box in addition to others specified in IS/IEC standards

7.1 Type Tests

a) For the Box:

Sr. No	Tests/ Standard	Requirements
1	Protection against electric shock (IS: 14772 -2000)	Enclosure shall be so designed that when they are mounted as for normal use, the live parts of any correctly installed accessories or any parts of these accessories which may become live due to a fault shall not be accessible.
2	Provision for earthing (IS: 14772 -2000)	Enclosure shall be provided with a facility for permanent and reliable connection to earthing
3	Resistance to ageing, humid conditions, Ingress of solid objects and to harmful ingress of (IS:14772 -2000)	Resistance to Ageing: Enclosure shall be kept in a heating cabinet with temp 70 ± 2 deg C for 7 days as per IS. After completion of the test, the enclosure shall not show any cracks. Humid conditions: Enclosure shall be kept in a cabinet with humidity between 91 to 95 % for 7 days as per IS. After completion of the test, enclosure shall not show any damage. . Resistance against ingress of solid objects and to harmful ingress of water: Enclosure shall be subjected to test for degree of protection (IP 55) as per IS 12063.

4	Mechanical strength/impact Resistance Test (IS:14772- 2000)/ (UL: 746 C)	The sample shall be subjected to Impact resistance test as per the respective standards and shall not show occurrence of any of the following: 1. making uninsulated live parts accessible to contact 2. producing a condition that might affect the mechanical performance of the enclosure 3. producing a condition that would increase the likelihood of an electric shock
5	Resistance to heat/ Ball Pressure Test (IS:14772 -2000)	The test shall be made on a sample in a heating cabinet at a temp of 125 ±2'C for 1hr per IS. After completion of test , the diameter of the impression caused by the ball shall be measured and should not exceed 2 mm.
6	Resistance to Abnormal heat and fire/ Glow wire test (IS:14772-2000)	Parts of insulating materials which might be exposed to thermal stresses due to electric effects shall not be affected by abnormal heat and by fire. The compliance shall be checked by means of the glow wire test performed at 850 ^{0} C, according to IS 11000 (Part 2/sec 1) with no flame and glowing.
7	Resistance to Tracking (IS 14772-2000)	The sample when tested as per clause no 17 of IS: 14772, shall show no flashover after completion of the Test.
8	Flammability test (IS: 11731 (Part II)-1986)/ UL:94)	The sample shall comply to flammability requirements of category FVO as per respective standards.
9	Test for self-extinguishing property IS:4249-1967	The sample when tested as per clause 3.5.1 of IS 4249, shall comply to the specified requirements
10	Test for water absorption (IS: 5133 (Part 11)-1969)	The sample shall be heated to a temperature of 50±3'C for 24 h, as per IS and after completion, the water absorbed should not be more than 1%
11	Verification of Die-electric properties (IS: 8623 (Part 1)-1993)	The enclosure shall be tested as per clause no 8.22 of IS 8623 (Part 1), with test voltage of 5KV for 1 minute and withstand it satisfactorily.
12	UV light Exposure (UL-746C)	The sample when exposed to UV light as per the defined test method, shall comply to following a) Physical Properties: The average value of physical properties after the UV light exposure shall not be tower than 70% of its initial value (without UV aging) i.e. the variation shall not be more than 30%. b) Flammability Test: After the UV light exposure, the flammability requirement of FVO shall remain unchanged.

		c) Flexural Strength: After the UV light exposure, Flexural strength shall not be lower than 70% of its initial value (without UV aging) i.e. the variation shall not be more than 30%.

b) For Bus Bar

S.No.	Test/ Standard	Requirements
1	Verification of temperature Rise test (IS:8623 Part-I Cl.No. 8.2.1)	Maximum permissible temperature rise for the busbar and terminals shall be 850 C and 1100 C respectively.
2	Verification of Dielectric Strength (IS:8623 Part-I Cl.No. 8.22)	The test voltage at the moment of application shall not exceed 50% of the 2.5kV and it shall then be increased steadily within a few seconds to the full value and maintained for 1 minute. Their shall be no flash over at the bus bars.
3	Short circuit withstand Strength. (IS:8623 Part-I Cl.No. 8.2.3)	The assemblies shall be rated for prospective short circuit current of 3kA for 1 Sec.
4	Verification of Clearance and Creepage distance. (IS:8623 Part-I Cl.No. 8.2.5)	The clearance and creepage distance shall comply with dielectric properties, abnormal conditions such as short circuit, which shall not reduce the distance between busbars and connection.
5	Mechanical Operations IS:8623 Part-I Cl.N0. 8.2.6	The number of operating cycles shall be 50
6	Tab Pull out Test (UL-1059)	The male tab block employing quick- connect terminals shall be subjected to a direct, in line pull along the axis of the tab. The force of 89N pull shall be applied on the terminal block mounted as in service condition and this shall be with stood satisfactorily.
7	Heat cycle Test (UL 1059)	Current of 150% of rated current is to be passed through the connection for 84 ON periods of 3.5 hrs, each followed by a 1/2 hour OFF period as specified in the standard, temperature rise for 'the last ON period shall not be more than 5deg C higher than the first ON period.

7.2 Routine tests (For Boxes and Bus Bar):

a) Marking
b) Visual Examination and Dimensions
c) Protection against electric shock
d) Provision for earthing
e) Test for self-extinguishing properties

7.3 Acceptance tests

Following tests shall be performed as per the sampling plan defined in the Cl. No. 10 of the IS 2500 for ever offered lot size.

a) <u>For Boxes:</u>

i Marking
ii Visual Examination and Dimensions
iii Protection against electric shock
iv Provision for earthing
v Resistance to ageing, humid conditions, Ingress of solid objects and to harmful ingress of water
vi Mechanical strength/Impact Resistance Test
vii Resistance to Abnormal heat and fire / Glow wire test
viii Flammability test

ix Test for Self Extinguishing Property.
x Verification of Dielectric properties.

b) For Bus Bar
i Temperature Rise Test
ii Verification of Dielectric Properties of moulded casing of bus bar
iii Glow Wire Test at 950 degree Centigrade of moulded casing bus bar

7.4 TESTS AT SITE :
The purchaser reserves the right to conduct all tests on each type of Spring Loaded Constant Pressure Multi-connection Distribution system after arrival at site and bidder shall guarantee test certificates figures under actual service conditions.

8. TYPE TEST CERTIFICATES:
The bidder shall furnish the type test certificates for the tests as mentioned above as per the corresponding standards. All the tests shall be conducted at CPRI/ERDA as per the relevant standards, Type tests should have been conducted in certified Test laboratories during the period not exceeding 5 years from the date of opening the bid. In the event of any discrepancy in the test reports, i.e. any test report not acceptable, same shall be carried out without any cost implication to the Purchaser.

9. PRE- DESPATCH INSPECTION:
Equipment shall be subject to inspection by a duly authorized representative of the Purchaser. Inspection may be made at any stage of manufacture at the option of the purchaser and the equipment if found unsatisfactory as to workmanship or material, the same is liable to rejection. Bidder shall grant free access to the places of manufacture to the Purchaser's representatives at all times when the work is in progress. Inspection by the Purchaser or its authorized representatives shall not relieve the supplier of his obligation of furnishing equipment in accordance with the specifications. Material shall be dispatched after specific MDCC (Material Dispatch Clearance Certificate) is issued by the Purchaser.

Following documents shall be sent along with material:

a) Test reports
b) MDCC issued by Purchaser
c) Invoice in duplicate
d) Packing list
e) Drawings & catalogue
f) Guarantee / Warrantee card
g) Delivery Challan
h) Other Documents (as applicable)

10. INSPECTION AFTER RECEIPT AT STORE:
The material received at the Purchaser store shall be inspected for acceptance and shall be liable for rejection, if found different from the reports of the pre-dispatch inspection and one copy of the report shall be sent to Project Engineering department.

11. GUARANTEE:
Bidder shall stand guarantee towards design, materials, workmanship & quality of process I manufacturing of items under this contract for due and intended performance of the same, as an integrated product delivered under this contract. In the event any defect is found by the purchaser up to a period of at least 60 months from the date of commissioning or 66 months from the date of last

supplies made under the contract whichever is later, Bidder shall be liable to undertake to replace/rectify such defects at its own costs, within mutually agreed time frame, and to the entire satisfaction of the Company, failing which the purchaser will be at liberty to get it replaced/rectified at bidder's risks and costs and recover all such expenses plus the Company's own charges (@ 20% of expenses incurred), from the bidder or from the " Security cum Performance Deposit" as the case may be. Bidder shall further be responsible for free replacement for another period of THREE years from the end of the guarantee period for any 'Latent Defects' if noticed and reported by the purchaser.

12. PACKING:

Bidder shall ensure that all the equipment covered under this specification shall be prepared for rail/road transport in a manner so as to protect the equipment from damage in transit. The material used for packing shall be environmentally friendly.

13. QUALITY CONTROL:

The bidder shall submit with the offer Quality assurance plan indicating the various stages of inspection, the tests and checks which will be carried out on the material of construction, components during manufacture and bought out items and fully assembled component and equipment after finishing. As part of the plan, a schedule for stage and final inspection within the parameters of the delivery schedule shall be furnished, The Purchaser's engineer or its nominated representative shall have free access to the manufacturer's/sub-supplier's works to carry out inspections.

14. MINIMUM TESTING FACILITIES:

Bidder shall have adequate in house testing facilities for carrying out all routine tests, acceptance tests as per Indian/ international standards.

15. MANUFACTURING ACTIVITIES:

The successful bidder will have to submit the bar chart for various manufacturing activities clearly elaborating each stage, with quantity. This bar chart should be in line with the Quality assurance plan submitted with the offer. This bar chart will have to be submitted within 15 days from the release of the order.

16. DRAWINGS:

After the award of the contract four (4) copies of following drawings, drawn to scales describing the equipment in detail shall be forwarded for approval.

Sr. No.	Description	For Approval	For Review Information	Submission
1	Technical Parameters	√		√
2	General Arrangement drawings	√		√
3	Bus bar arrangement	√		√
4	Single Line diagram and wiring diagram	√		√
5	Manual/ catalogues	√	√	√
6	Transport/ Shipping dimension drawing	√	√	√
	QA & QC Plan	√	√	√

8	Routine, Acceptance and Type Test Certificates	√	√	√

Bidder shall be subsequently provide four (4) complete sets of final drawings, one of which shall be auto positive suitable for reproduction, before the dispatch of the equipment. Soft copy (Compact Disk CD) of all the drawing, GTP, Test certificates shall be submitted after the final approval of the same to purchaser.

All the documents & drawings shall be in English language.

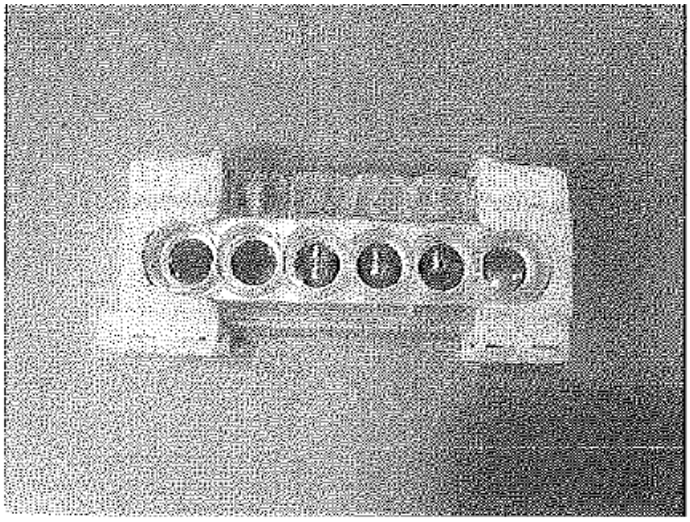
Instruction Manuals: Bidder shall furnish two softcopies (CD) and four (4) hard copies of nicely bound manuals (In English language) covering erection and maintenance instructions and all relevant information and drawings pertaining to the main equipment as well as auxiliary devices.

17. GUARANTEED TECHNICAL PARTICULARS:

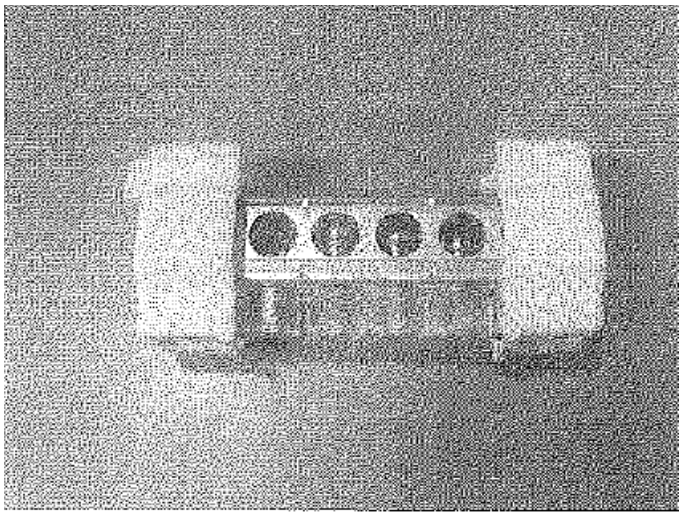
Sr. No	Particulars	Unit	As furnished by Bidder
1	Incoming Supply	Single Phase/ Three phase	
2	Type of Box	Type A/B (For Single Phase	
3	Application	Out Door	
4	Number of Incomings	Nos.	
5	Number of Outgoings	Nos.	
6	Incomer cable size	Sq. mm.	
7	Outgoing cable size	sq. mm.	
8	Number of bus Bar Sets	Nos.	
9	Degree of Protection	IP55	
10	Dielectric withstand for the box	kV	
11	Flammability Requirement	FV0	
12	Box Material		
13	Colour of the Box		
14	Thickness of the Box	Mm	
15	Material of Gasket		
16	Material withstand Temperature	Deg C	
17	Dimension of the Box. Height/Width/depth	Mm	
18	Earthing Arrangement	Yes	
19	Sealing Arrangement	Yes	
20	Hinges	Yes	
21	**Bus Bar**		
a)	Rated Voltage	kV	
b)	System Voltage	kV	
c)	Rated Current of the Bus Bar	Amps.	
d)	Number of Bus Bar	Nos.	
e)	Bus Bar Material		
f)	Current Density	Amp/Sq.mm	
g)	Temperature Rise	Deg C	
h)	Short Time withstand current	kA for 1 Sec.	

i)	Material of insulation for mounting Bus bar (Bus Bar Supports		
j)	Clearance between phases	mm	
k)	Clearance between phase to neutral	mm	
l)	Number of Terminals Working + Spare	Nos.	
22	Weight of the Box	Kg	
23	Weather Recyclable Material	Yes / No	
24	Expected for Enclosure/ Bus Bar and its Assembly	Years	

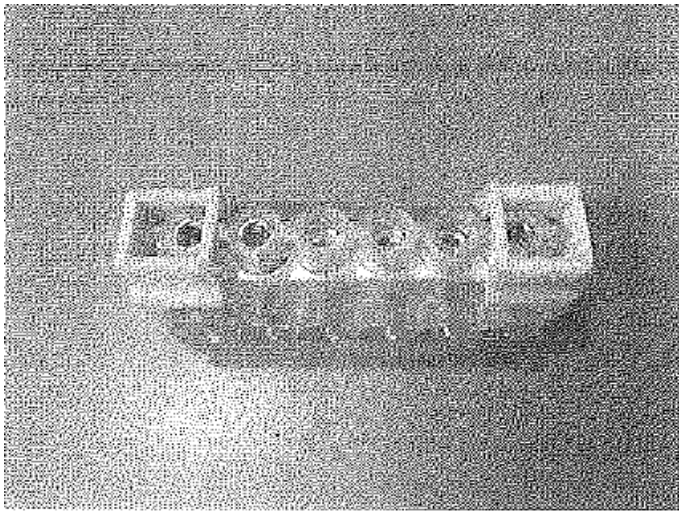
18. <u>Reference Drawings/(Tentative):</u>



Bottom View



Back View



Front View

Clamps & Connectors

CLAMPS & CONNECTORS: Clamps & connectors shall conform to IS: 5561. The clamps and connectors shall be made of materials listed below:

For connecting ACSR conductors	Aluminium alloy casting, conforming to designation A6 of IS: 617 and shall be tested for all test as per IS: 617
For connecting equipment terminals made of copper with ACSR conductor	Bimetallic connectors made from aluminium alloy casting conforming to designation A6 of IS:617 with 2mm thick Bimetallic liner and shall be tested as per IS:617
For connecting GS shield wire	Galvanised mild steel
Bolts, Nuts & plain washers	Hot dip galvanised mild steel for sizes M12 and above, and electro-galvanised for sizes below M12
Spring washers for items a to c	Electro-galvanised mild steel suitable for at least service condition 4 as per IS:1573

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

No current carrying part of a clamp or connector shall be less than 10 mm thick. They shall be designed and manufactured to have minimum contact resistance.

For Bimetallic clamps or connectors, copper alloy liner of minimum 2 mm thickness shall be provided.

Flexible connectors, braids or laminated strips made up of copper/ aluminium for the terminal clamps for equipment shall be suitable for both expansion or through (fixed/ sliding) type connection of IPS Aluminium tube as required. In both the cases the clamp height (top of the mounting pad to center line of the tube) should be same.

Size of the terminal/conductor for which the clamp/connector is suitable shall be embossed/punched (i.e. indelibly marked) on each components of the clamp/ connector, except on the hardware.

Clamp shall be designed to carry the same current as the conductor and the temperature rise shall be equal or less than that of the conductor at the specified ambient temperature. The rated current for which the clamp/ connector is designed with respect to the specified reference ambient temperature, shall also be indelibly marked on each component of the clamp/connector, except on the hardware.
Clamps and connector shall be designed corona controlled.
Clamps & connectors shall conform to type tests and shall be subjected to routine and acceptance tests on minimum 3 samples per lot as per IS: 5561. Type tests report for all clamps and connectors for temperature rise test, tensile test, shall be furnished by the Contractor.

Annexure D: List of Parameters

Display Sheet - LTCT			
Sr. No.	**Auto Scroll Mode**	**Sr. No.**	**Push Button mode**
1	LCD Test	1	LCD Test
2	Meter Serial No	2	Meter Serial No
3	Date	3	Date
4	Time	4	Time
5	Billing Reset KWH for last month (B1)	5	Billing Reset KWH for last month (B1)
6	Billing Reset KVAH for last month (B1)	6	Billing Reset KVAH for last month
7	Billing MD KW for last month with date and time	7	Billing MD KW for last month with date and time
8	Billing MD KVA for last month with date and time	8	Billing MD KVA for last month with date and time
9	Billing Average PF for last month	9	Billing Average PF for last month
10	Cumulative Active Energy	10	Cumulative Active Energy
11	Cumulative Apparent Energy	11	Cumulative Apparent Energy
12	Cumulative Reactive Lag Energy	12	Cumulative Reactive Lag Energy
13	Cumulative Reactive Lead Energy	13	Cumulative Reactive Lead Energy
14	Current MD KW	14	Current MD KW
15	Current MD KVA	15	Current MD KVA
16	R Phase Voltage	16	Active Power (kW)
17	Y Phase Voltage	17	Apparent Power (kVA)
18	B Phase Voltage	18	Instantaneous PF Total
19	R Phase Current	19	Billing Counter
20	Y Phase Current	20	R Phase Voltage
21	B Phase Current	21	Y Phase Voltage
22	Instantaneous PF Total	22	B Phase Voltage
23	Instantaneous frequency	24	R Phase Current
24	Active Power (kW)	25	Y Phase Current
25	Apparent Power (kVA)	26	B Phase Current
26	R phase Voltage THD	27	R Phase Instantaneous PF
27	Y phase Voltage THD	28	Y Phase Instantaneous PF
28	B phase Voltage THD	29	B Phase Instantaneous PF
29	R phase current THD	30	Voltage Phase Sequence
30	Y phase current THD	31	Current Phase Sequence
31	B phase current THD	32	RTC battery status
		33	NVM status
		34	Cumulative MD kW

35	Cumulative MD kVA
36	Rising Demand KW with elapsed time (in MM:SS)
37	Rising Demand KVA with elapsed time (in MM:SS)