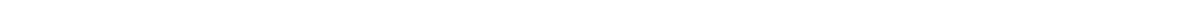


# Technical Specification for 11 kV Metering Cubicle



## 1. Scope of supply

- 1.1. This specification covers design, fabrication, manufacture, painting, testing, supply and delivery of following variants of 11KV metering cubicles for HT consumers with 0.2S class 11 KV CTs (3 Nos.), PTs (3 Nos.), bushings, connecting bus bars, control cables duly terminated suitable for use with three phase four wire bulk supply energy measurement system and for indoor as well as outdoor application.

Sr.	Material Description	Material Code for Ahmedabad	Material Code for Surat
1	11 KV Metering cubicle with CT Ratio 25/5	10022315	10038548
2	11 KV Metering cubicle with CT Ratio 50/5	10040846	10040846
3	11 KV Metering cubicle with CT Ratio 100/5	10044676	10040847
4	11 KV Metering cubicle with CT Ratio 200/5	10042658	10044189
5	11 KV Metering cubicle with CT Ratio 300/5	10043352	10043352

- 1.2. It is not the intent to specify completely herein all the details of the design and construction of material. However the product shall conform in all respects to high standards of engineering, design and workmanship and shall be performing in continuous commercial operation in manner acceptable to the purchaser. The offered material shall be complete with all components necessary for their intended purpose. The design, manufacture and performance of equipment shall comply with all currently applicable standards, regulations and safety codes in the locality where the equipment will be installed. Nothing in this specification shall be construed to relieve vendor of this responsibility. Moreover, the design and components shall be deemed to be within the scope of vendor's supply irrespective of whether those are specifically brought out in this specification and/or the commercial order or not.
- 1.3. Any deviation from this specification to improve utility performance and efficiency of 0.2S class 11KV metering cubicles or to secure overall economy shall be considered, if such deviations are mentioned by the bidder with full justification.

## 2. Service conditions

The metering cubicle shall be suitable for continuous satisfactory operation in following prevailing climatic conditions.

- 2.1. Maximum Ambient Air Temperature : 50° C
- 2.2. Minimum ambient air temperature : 2° C
- 2.3. Average daily ambient air temperature : 40° C
- 2.4. Maximum Relative Humidity : 95%
- 2.5. Maximum wind speed : 44 m/sec
- 2.6. Average Annual rainfall : 750mm
- 2.7. Seismic Zone : 3

The overall climatic condition is moderately hot and humid tropical climate, conducive to rust and fungus growth

### 3. Applicable standards

- 3.1. The equipment covered by this specification shall unless otherwise stated, be designed, manufactured and tested in accordance with latest editions of the applicable Indian and IEC standards and shall conform to the regulations of local statutory authorities. Non-exhaustive lists of applicable standards to various equipments / accessories are enlisted as under.
- 3.2. The metering cubicle shall conform to following standards with latest revision.
  - 3.2.1. IS 2705\_Part 1 : Current transformers: Part 1 General requirements
  - 3.2.2. IS 4146 : Application guide for voltage transformers
  - 3.2.3. IS 16227\_Part 1 : Instrument Transformers Part 1 General Requirements
  - 3.2.4. IS 16227\_Part 3 : Instrument Transformers Part 3 Additional Requirements for Inductive Voltage Transformers
  - 3.2.5. IS/IEC 60947 : Low voltage switchgear and control gear
  - 3.2.6. IS 5-2007 : Colors for Ready Mixed Paints and Enamels
  - 3.2.7. IS 2551-1982 : Danger notice plates
  - 3.2.8. IS 3043-2018 : Code of practice for earthing

3.2.9.	IS 10580-1983	:	Service Conditions for electrical equipments
3.2.10.	IS 11353	:	Basic and Safety Principles for Man-Machine Interface Marking and Identification - Identification of Equipment Terminals Conductor Terminations and Conductors
3.2.11.	IS 5578	:	Guide for marking of insulated conductors
3.2.12.	IS 8923-1978	:	Warning symbol for dangerous voltages
3.2.13.	IS/IEC 62271_Part 200	:	High-Voltage Switchgear and Controlgear Part 200 AC metal enclosed switchgear and control gear for rated voltages above 1KV up to and including 52KV
3.2.14.	IS 11149-1984	:	Rubber Gasket
3.2.15.	IS/IEC 60529	:	Degrees of protection provided by enclosures (IP CODE)
3.2.16.	IS 2016	:	Specification for Plain Washers
3.2.17.	IS 1367_Part 14_Sec 1	:	Technical Supply Conditions for Threaded Steel Fasteners Part 14 mechanical Properties of Corrosion - Resistant Stainless - Steel Fasteners Section 1 Bolts,Screws and Studs
3.2.18.	IS 1367_Part 14_Sec 2	:	Technical Supply Conditions for Threaded Steel Fasteners Part 14 Mechanical Properties of Corrosion-resistant Stainless steel Fasteners Section 2 Nuts with specified grades and property classes
3.2.19.	IS 1367_Part 14_Sec 3	:	Technical Supply Conditions for Threaded Steel Fasteners Part 14 Mechanical Properties of Corrosion-resistant Stainless-steel Fasteners Section 3 Set Screws and Similar Fasteners not Under Tensile Stress
3.2.20.	ISO 3506_Part 1	:	Mechanical properties of corrosion resistant stainless-steel fasteners - Part 1:

Bolts, screws and studs

3.2.21. CEA Regulation Central Electricity Authority (Installation : and Operations of Meters) Regulation – 2011

- 3.3. Unless otherwise specified elsewhere in this specification the materials shall conform to the latest version available of the standards as specified above.
- 3.4. Material conforming to other internationally accepted standards, which ensure equal or higher quality than the standards mentioned above would also be acceptable. In case the bidders who wish to offer material conforming to the other standards, salient points of difference between the standards adopted and the specific standards shall be clearly brought out in relevant schedule. Copy of such standards with authentic English Translations, shall be furnished along with the offer. In case of conflict the order of precedence shall be (i) IS, (ii) IEC, (iii) other standards. In case of any difference between provisions of these standards and provisions of this specification, the stringent provisions shall prevail.

#### **4. Design criteria**

- 4.1. The metering cubicle shall be capable of continuous operation of rated output under the operating conditions of voltage and frequency variations as per statutory limits governed by relevant Indian Standard and its amendments in force.
- 4.2. The design, materials and construction shall ensure secure reliability, economy, safe and convenient operation and shall include all specified or unspecified incidental items necessary for similar equipment for convenient working in every respect.
- 4.3. All the material used in the manufacture of the Metering cubicle shall be of highest quality and reputed make to ensure higher reliability, longer life and sustained accuracy.
- 4.4. The metering cubicle shall be designed compartmentalized namely Instrument transformer compartment, HT cable termination compartments and Metering compartment.
- 4.5. All parts, which are subject to corrosion under normal working conditions, shall be protected effectively. Any protective coating shall not be liable to damage by ordinary handling or damage due to exposure to air, under normal working conditions.
- 4.6. The design of the metering cubicle shall be based on safety to personnel and equipment during operation and maintenance, reliability of service, ease of maintenance, mechanical protection of equipment, interchangeability of equipment and ready addition of future loads.

- 4.7. The design of the metering cubicle shall be such that no permanent or harmful distortion occurs due to outdoor installation, excessive temperature, momentary overloading etc.
- 4.8. All materials used should be of the best quality suitable for withstanding variations of temperatures and atmospheric conditions without undue deterioration or setting up of undue stresses anywhere. The metering cubicle shall be designed to avoid collection of water anywhere. All connections and contacts shall be of ample cross sections and surface for carrying specified currents continuously without undue heating.
- 4.9. All insulating material used in the construction of the Metering cubicle shall be non-hygroscopic, non-aging and of tested quality.
- 4.10. The metering cubicle shall be designed and constructed in such a way as to avoid introducing any danger in use and under normal conditions so as to ensure specially
  - 4.10.1. Personnel safety against electric shock
  - 4.10.2. Personnel safety against effects of excessive temperature
  - 4.10.3. Protection against spread of fire
  - 4.10.4. Protection against penetration of solid objects, dust and water.
- 4.11. Purchaser will provide the suitable size of power cable and termination accessories only. All other material including CT cable, PVC pipe and foundation work are to be arranged by the supplier.

## **5. General requirements**

### **5.1. Enclosure**

- 5.1.1. The enclosure and doors shall be made of minimum 3 mm thick Galvanized steel sheet of 220 GSM conforming to IS 277: 2003, tropicalized to meet Indian weather condition.
- 5.1.2. The metering cubicles shall be suitable for indoor and outdoor installation in hot humid tropical atmosphere.
- 5.1.3. All equipments, accessories and wiring shall be provided with tropical finish to prevent fungus growth.
- 5.1.4. The metering cubicles shall be used as a standalone unit with one set of floor mounting pedestals and appropriate cable supporting structure.
- 5.1.5. The height of meter to be at normal human vision in standing position with approx. 1.6 meters.

- 5.1.6. All the material and components used in the manufacture of the metering cubicle shall be of highest quality and reputed make to ensure higher reliability, longer life and sustained accuracy.
- 5.1.7. The construction of the cubicle shall be modular type. It shall be possible to replace the CTs of different ratios easily without any modification in either bus bars or connections.
- 5.1.8. The metering cubicles shall be capable of continuous operation with rated output under the operating conditions of voltage and frequency variations as per statutory limits governed by relevant Indian Standards and Electricity Act-2003 and its amendments in force.
- 5.1.9. The overall dimension of the all variants of metering cubicles shall be identical and shall not be more than 1250 mm (Width) x 1000 mm (Depth) x 1700 mm (Height).
- 5.1.10. The design of equipment shall be compact, reliable, rugged, economic, safe, and convenient to operate and conform to best engineering practice.
- 5.1.11. The metering cubicles shall be floor-mounting type and the bottom channel design to allow free shifting on floor.
- 5.1.12. Parts those are subjected to corrosion under normal working conditions shall be protected effectively and the protective coating shall be strong enough to withstand its quality in normal working conditions.
- 5.1.13. The metering cubicles shall be capable to withstand solar radiation.
- 5.1.14. The insulating materials used in the construction of the cubicle shall be non-hygroscopic, non-aging and of good quality.
- 5.1.15. The enclosure shall have the 4 Nos. of listing hook made from adequate thickness Galvanized sheet. It shall be welded continuously with the enclosure and shall be capable enough to bear the weight of complete assembled unit.
- 5.1.16. The CTs, PTs, bushings, cable boxes, wires, bus bars and the enclosure shall ensure reasonable safety against the spread of fire. They should not be ignited by thermal overload of live parts in contact with them.
- 5.1.17. Welding in cubicle to be arc type and pattern to be continuous at all joints.
- 5.1.18. 11KV metering cubicles shall be supplied with 11KV CT/PT (0.2S Accuracy Class).
- 5.1.19. It shall be possible to replace the CTs/PTs of different ratios easily from top of the cubicle after removing the top cover.

## 5.2. Instrument Transformer Compartment

- 5.2.1. 3 No's of CTs and PTs shall be mounted in this compartment.
- 5.2.2. 11KV class epoxy bushing (molded type) shall be provided on either side of the CT/PT compartment leading to two cable compartments.
- 5.2.3. The inside terminals of bushings and the primary terminals of CTs & PTs shall be connected by electrolytic grade tinned copper bus bars of 30 mm x 6 mm size.
- 5.2.4. Inter connection bus bars/Links shall be insulated by heat shrinkable insulating tube suitable for 11KV system.
- 5.2.5. The CTs and PTs shall be firmly mounted on vertical plate of this compartment.
- 5.2.6. Inter-phase barriers (FRP / Bakelite sheet) shall be provided between CTs and PTs to avoid flashovers in case of humid and dusty environment.
- 5.2.7. The CT/PT compartment shall be covered with top cover plate of the cubicle shall be suitably sloped to facilitate water drain off.(@ 5deg slop)
- 5.2.8. 4 Nos. of top cover handles shall be provided on the top cover to aid easy fixing/opening.
- 5.2.9. The detachable cover shall be provided with suitable interlock so that it cannot be opened without opening the door of the meter compartment.
- 5.2.10. The compartment shall be provided with sufficient ventilation to limit the inside temp. Below 75° C.
- 5.2.11. There shall not be any louvers in the metering cubicle for ventilation. However, the construction of the cubicle shall be such that overall temperature inside the compartment shall remain below 75 deg. Centigrade.
- 5.2.12. All materials used should be of the best quality suitable for withstanding variations of temperatures and atmospheric conditions without undue deterioration or setting up of undue stresses anywhere. All mountings should be so designed as to avoid collection of water anywhere. All connections and contacts shall be of ample cross sections and surface for carrying specified currents continuously without undue heating and shall be secured by nut bolts, screws with adequate loading arrangement.



- 5.2.13. Nitrile Rubber gaskets to be provided on the frame of compartments for ingress protection. Preferred make is Champion seals India Private Limited., National Rubber Industries & other reputed brand.
- 5.2.14. Instrument Transformer Compartment shall be designed such way that interchangeability of CTs as well as PTs of 0.2S class can be possible.
- 5.2.15. The VPIS shall be provided for both incoming and outgoing compartment. The VPIS shall be mounted of front door and the power availability status shall be clearly visible while door closed.

### 5.3. **Cable compartments**

- 5.3.1. The LHS cable compartment shall be for incoming cable and RHS shall be for outgoing cable when referred to metering compartment viewing from the front side.
- 5.3.2. Cable compartments are provided to house cable terminations on either side of the cubicle.
- 5.3.3. The compartment shall have detachable split type gland-plates with knock out at the bottom side for accommodating 11KV XLPE cable. The cable gland shall be suitable for 70 / 185 / 240 / 300 sq. mm 11 KV cable.
- 5.3.4. Detachable covers with two handles shall be provided on sides of these compartments.
- 5.3.5. The covers shall be placed /fixed with M10/M12 SS hex bolts those welded to the frame of cubicle.
- 5.3.6. Connecting leads of adequate size with terminal clamps for connecting the cable terminals to bus bars shall be provided.
- 5.3.7. Two nos. of plain washer, one spring washer, two nuts and one bolt shall be provided on each bushing for incoming/outgoing cable connections.
- 5.3.8. Nitrile Rubber gaskets to be provided on the frame of compartments for ingress protection. Preferred make is Champion seals India Private Limited., National Rubber Industries & other reputed brand.
- 5.3.9. Phase indicators and incoming/outgoing marking shall be provided inside and outside the cable compartments.
- 5.3.10. Two Nos. of danger boards of aluminum plate shall be provided as per relevant standards. The danger plate shall be riveted with the front side of the cable termination box.

### 5.4. **Metering Compartment**

- 5.4.1. The 11KV metering cubicles shall have compartment to house the energy meter and test terminal block.
- 5.4.2. The meter is not within the scope of the supply, but necessary provision for its installation shall be made in the meter compartment.
- 5.4.3. Nitrile Rubber gaskets to be provided on the door frame of meter compartment.
- 5.4.4. The door shall be supported by strong, heavy-duty, concealed type hinges.
- 5.4.5. The door hinges should not be accessible from outside in any case.
- 5.4.6. The Meter compartment shall have a viewing window with toughened glass of adequate size to ensure clear visibility of for easy/free viewing of both the energy meter display.
- 5.4.7. The glass should be provided with suitable weatherproof seal to prevent ingress of rainwater and dust.
- 5.4.8. Paper/Nylon washer to be provided with hardware fixing the glass to avoid any crack at fixing point.
- 5.4.9. Fixing hardware of glass shall not be accessible from outside the compartment.
- 5.4.10. Door of Meter compartment shall be earthed with separate earth braid of adequate size.
- 5.4.11. Door of Meter compartment shall have door handle for grip to door while open/close operation.
- 5.4.12. The covers shall be placed /fixed with M10/M12 SS hex bolts those welded to the frame of cubicle.
- 5.4.13. The metering compartment shall be facilitated with enough space to accommodated ABT meter with Check meter side by side. The mounting arrangement shall be provided accordingly with minimum safe distance.
- 5.4.14. It shall be possible to install 2 Nos. of GSM/GPRS Modem to facilitate remote metering with provision to bring out its antenna.
- 5.4.15. Single phase 15 Amp socket shall be provided with switch for charging of the modem. Suitable wiring shall be incorporated within the wiring diagram.

**5.5. Current Transformers**

- 5.5.1. The CTs shall be suitable for 3Phase 4 Wire 50 Hz systems as required.

5.5.2. The bidder shall use metering class current transformers manufactured by highly reputed firms across the world. Following are the list of approved makes of CTs. However, purchaser is open to accept any other equivalent quality.

5.5.2.1. Automatic Electric

5.5.2.2. Silkans

5.5.2.3. Crompton Greaves

5.5.2.4. Paras Power Engineering

5.5.2.5. Kappa Electricals

5.5.2.6. Ashmor Electricals

5.5.2.7. Narayan Power Tech

5.5.2.8. Huphen Fabricators

5.5.2.9. Huphen Electromech

5.5.2.10. Baroda Bushing

5.5.3. The CTs shall conform to the following technical particulars and requirements of IS 2705\_Part-I with latest amendments.

5.5.3.1. Type : Single Phase

5.5.3.2. Insulation Class : Class E

5.5.3.3. Rated Voltage : 11 KV

5.5.3.4. Basic Insulation Level : 12/36/95 KV

5.5.3.5. Rated Primary Current : 25/50/100/200/300

5.5.3.6. Rated Secondary Current : 5 A

5.5.3.7. Rated continuous thermal : 120% of I rated  
current

5.5.3.8. Accuracy class : 0.2S

5.5.3.9. Burden : 2.5 VA

5.5.3.10. Instrument Security Factor : < 5

5.5.3.11. Power Frequency withstand : 36KV for 1 Minute  
voltage

- 5.5.3.12. Impulse voltage withstand : 95 KV peak capacity
- 5.5.3.13. S/C withstand current and : 21 KA for 1 Sec. duration (KA rms / Sec)
- 5.5.3.14. Temperature rise (Maximum) : 70° C
- 5.5.3.15. Rated dynamic withstand : 2.5 times (250%) STC current (Short Time Current)

- 5.5.4. The CTs shall be of indoor, single core wound primary, drying resin cast type with ratio & class as per the requirement.
- 5.5.5. The core lamination shall be of high-grade steel or other equivalent alloy.
- 5.5.6. The CTs shall be able to withstand the thermal and mechanical stresses resulting from the maximum short circuit and momentary current ratings as well as completely encapsulated.
- 5.5.7. The resin used for manufacturing of CTs shall be from reputed make and resin casting to be carried out under vacuum by only hot setting process.
- 5.5.8. The CTs shall have polarity marks indelibly marked on each transformer and at the associated terminal block.
- 5.5.9. Each current transformer shall have rating plate with all relevant details in accordance with IS: 2705. The rating plate shall be made of noncorrosive material and indelibly punched / painted and shall be firmly fixed on to body of the CTs.
- 5.5.10. In addition to the rating plate, the CTs shall have serial numbers and ratios embossed on the body of the CT, so as same is visible from the top after removing the top cover.

**5.6. Potential Transformers**

- 5.6.1. The potential transformers offered by the bidder shall be manufactured by highly reputed firms across the world.
- 5.6.2. Following are the list of approved makes of PTs. However, Purchaser is open to accept any other equivalent quality.
  - 5.6.2.1. Automatic Electric
  - 5.6.2.2. Silkans
  - 5.6.2.3. Crompton Greaves
  - 5.6.2.4. Paras Power Engineering

- 5.6.2.5. Kappa Electricals
- 5.6.2.6. Ashmor Electricals
- 5.6.2.7. Narayan Power Tech
- 5.6.2.8. Huphen Fabricators
- 5.6.2.9. Huphen Electromech
- 5.6.2.10. Baroda Bushing.
- 5.6.3. The potential transformers (PTs) shall confirm to following technical particulars and requirements.
  - 5.6.3.1. Type : Single Phase
  - 5.6.3.2. Insulation Class : Class E
  - 5.6.3.3. Rated Voltage : 11 KV
  - 5.6.3.4. Basic Insulation level : 12/36/95 KV
  - 5.6.3.5. Rated Primary Voltage : 11000/ $\sqrt{3}$  Volts
  - 5.6.3.6. Rated Secondary Voltage : 110/ $\sqrt{3}$  Volts
  - 5.6.3.7. Accuracy class : 0.2s
  - 5.6.3.8. Burden : 15 VA
  - 5.6.3.9. Instrument Security Factor : <5
  - 5.6.3.10. Voltage Factor : 1.2 for continuous and 1.9 for 30 sec.
  - 5.6.3.11. Power Frequency withstand voltage : 36 KV for 1 Minute
  - 5.6.3.12. Impulse voltage withstand capacity : 95 KV peak
  - 5.6.3.13. Temperature rise (Maximum) : 70° C
- 5.6.4. The PTs shall be of indoor, single core wound primary, drying resin cast type and with ratio as per the requirement.
- 5.6.5. The Core lamination shall be with high-grade steel or other equivalent alloy.

- 5.6.6. The PTs shall be able to withstand the thermal and mechanical stresses resulting from short circuits and spikes as well as completely encapsulated.
- 5.6.7. The PT shall be provided with suitable rating of HRC fuse for protection.
- 5.6.8. The resin used for manufacturing of PTs shall be from reputed make and resin casting to be carried out under vacuum by only hot setting process.
- 5.6.9. Each potential transformer shall have rating plate with all relevant details. The rating plate shall be made of noncorrosive material and indelibly punched / painted and shall be firmly fixed on to body of the PTs

**5.7. Bushings**

- 5.7.1. The epoxy bushing terminals shall be suitable for 12KV / 36 KV / 95 KVp voltage systems.
- 5.7.2. The bidder shall use epoxy bushings manufactured by highly reputed firms across the world. Following are the list of approved make of bushings. However, Purchaser is open to accept any other equivalent quality.
  - 5.7.2.1. BHEL
  - 5.7.2.2. Jayshree Insulators
  - 5.7.2.3. WS Insulators
  - 5.7.2.4. Calcutta Ceramics
  - 5.7.2.5. Allied Ceramics
  - 5.7.2.6. Baroda Bushings
  - 5.7.2.7. Huphen Electromech
  - 5.7.2.8. Huphen Fabricator
- 5.7.3. The insulator shall be guaranteed for long, satisfactory performance conforming to technical particulars covered in IS:2099 with latest amendments.

**5.8. Test Terminal Block**

- 5.8.1. 3 Phase, 4 Wire, Front Connection, link type Test Terminal Block (TTB) with transparent polycarbonate cover and sealing Studs & Nuts shall be provided in the meter compartment.
- 5.8.2. The test terminal block shall be of high grade, non-hygroscopic, low tracking, fire resistant and made of high-grade engineering plastic that

have terminal holes of sufficient size to accommodate 4 Sq. mm, 6 Sq.mm & 2.5 Sq.mm stranded copper conductors.

- 5.8.3. The manner of fixing the terminals shall ensure adequate and durable contact and there is no risk of loosening or undue heating.
- 5.8.4. Two screws shall be provided in each terminal for effective clamping of the conductor or thimbles. Each clamping screw shall engage at least 3 threads in the terminal.
- 5.8.5. The terminals shall be suitable to carry up to 120% of max. loading continuously.
- 5.8.6. The terminals shall have suitable construction with barriers to prevent phase-to-phase short circuit inside TTB.
- 5.8.7. All parts of each terminal shall be such that the risk of corrosion resulting from contact with any other metal part is minimized.
- 5.8.8. The TTB offered shall be manufactured by highly reputed firms across the world. It is preferable that the supplier shall supply "DAV" make TTB. However, Purchaser is open to accept any other equivalent quality subject to its compliance to requirement of being transparent polycarbonate cover and It is approved by Purchaser.
- 5.8.9. The terminal cover made of transparent polycarbonate shall be placed in such a position that it is not possible to approach the connections or connecting wires. Suitable cutouts to be provided for cable entry.

5.9. **Secondary Wirings**

- 5.9.1. The secondary wiring of CTs and PTs shall be carried out by color coded of 1100 V grade stranded single core FRLSH cables. Size of copper cable shall be 6 Sq. mm for CTs and 2.5 Sq. mm for PTs.
- 5.9.2. The cables shall be crimped with insulated copper lugs and terminated with suitable fattener.
- 5.9.3. The secondary wires of the instrument transformers shall be routed through transparent colorless LDPE conduit from the instrument transformer compartment up to terminal block located in the meter compartment. The route of the conduit shall not be in any case through cable compartment.
- 5.9.4. The wire connections from the conduit shall enter the TTB from the rear side through hole of requisite diameter made in the partition sheet between meter compartment and instrument transformer compartment.

- 5.9.5. The load side wiring connections from the TTB shall be running in transparent HDPE conduits up to meter terminals. The meter ends of these wires shall be crimped with suitable pin type copper lugs.

**5.10. Busbar connections**

- 5.10.1. The busbar used for interconnection shall be made from ETP grade copper busbar (25 X 6 mm) confirming to IS 191 and its latest amendments.
- 5.10.2. Minimum clearance of bus bars shall be maintained according to requirements of IS: 4237.
- 5.10.3. The Bus bars shall be fitted /supported in a robust/secure manner by Epoxy with Brass tube conical bus bar supports.
- 5.10.4. Adequate contact pressure shall be kept by means of bolt/nut with plain washer (distribute the load under the bolt head evenly) and spring washer (Provide constant pressure on nut /Bolt).
- 5.10.5. Length of bolts used for bus bar joints and others shall have two threads exposed above the nut after complete tightening. The reason for this is that the first two threads of a bolt are often poorly formed and may not engage the nut properly. If they are not doing their share, the other threads in the nut will be overloaded, and the nut may slip.
- 5.10.6. The Bus bars connections shall be done using SS-304 hardware.
- 5.10.7. Symbol identifying the manufacture and Grade shall be marked on the head of Bolt.
- 5.10.8. Bolts, screws and nuts shall comply with requirements of IS 1367.
- 5.10.9. Red insulating sleeve shall be 10mm away from the conductor joints and Red, Yellow, Blue colored tape to be wound on the bus bars of CT/PT compartment and Cable compartment termination links.
- 5.10.10. Grommet shall be provided at the cutouts of cabinet wall where the bus bars pass through.

**5.11. Fasteners**

- 5.11.1. The fastener shall be made of SS 304 grade stainless steel.
- 5.11.2. The Nut bolt shall be of Austenitic grade confirming to IS 1367 (part-14) and its latest amendment.
- 5.11.3. Supplier shall maintain traceability from raw material procurement to finish product, and the certificate of Traceability should be submitted along with the consignment.
- 5.11.4. The mechanical properties of fasteners shall be as per IS 1367 and its latest amendments.



- 5.11.5. The bolts shall be supplied along with nut, two plain washers of 2 mm thickness and one spring washer suitable to size of bolt. The nut, bolt and washers shall be supplied in assemble condition.
- 5.11.6. The plain washer shall be confirming to IS 2016 and its latest amendments.
- 5.11.7. The spring washers shall be of Type B confirming to IS 3063 – 1994 and its latest amendments.
- 5.11.8. The fasteners shall be free from forging and threading defects such as cuts, spats, bulging taper eccentricity, loose fill etc. which may affect their serviceability.
- 5.11.9. The fasteners shall be such that it shall withstand adequate mechanical stress in extreme weather conditions.
- 5.11.10. The fasteners shall be smoothed and well finished. The threads shall be machined well for smooth movement of nut throughout the length.
- 5.11.11. Finished fasteners shall be surface treated against corrosion and atmospheric effect.
- 5.11.12. Dimensions and Tolerances shall be in accordance with the relevant Indian standard.

**5.12. Sealing Arrangement**

- 5.12.1. The assembly shall be designed such that instrument transformers, wiring and meters are theft resistant.
- 5.12.2. The metering cubicles along with meter box should have single point sealing arrangement.
- 5.12.3. The instrument transformer compartment shall not be open without opening a mechanical lock provided inside the meter compartment.
- 5.12.4. Separate sealing arrangement shall be provided for instrument transformer and meter compartment.
- 5.12.5. The sealing arrangement shall be suitable for application of polycarbonate seals and hologram seals.
- 5.12.6. The cubicle shall have following special features to prevent tampering of metering system.
  - 5.12.6.1. The door hinges of the metering compartment shall be welded from inside. Welding shall not be seen or accessible from outside.
  - 5.12.6.2. 02 No's threaded studs shall be welded from inside the meter compartment for sealing the meter compartment.

5.12.6.3. Bakelite plate for meter mounting shall be extended up to backside of the test terminal block.

5.12.6.4. Thread end of bolt shall have arrangement for sealing the Incoming and Outgoing compartment.

### 5.13. Earthing

5.13.1. Five independent SS-304 earthing bolts of at least M10 size should be provided on sides for inside and outside earthing. The bolts shall be welded to the body of the cubicle.

5.13.2. An earthing bus of copper strip size 25 X 3 mm shall be provided and extended throughout the length of the metering cubicle. It shall be bolted / brazed to the enclosure at two points.

5.13.3. PT primary earthing may be made at 2 locations by 25 X 3 mm copper strips.

5.13.4. All non-current carrying metalwork of the cubicle shall be effectively bonded to the earth bus.

5.13.5. Hinged doors shall be earthed through flexible earthing braid to provide the continuity after fitment of gasket.

5.13.6. Each compartment shall be connected with earthing strip by means of flexible insulated earthing braid.

## 6. Surface Finish

6.1. The metering cubicle shall have painted as per IS: 5 with powder coating finish on the exterior and interior surfaces suitable for indoor and outdoor application.

6.2. All surfaces of both the sides of the cubicle enclosure shall undergo 3-tank chemical treatment process where the surface shall be degreased, Water Rinse, de-rusting and pickle.

6.3. Degreasing

This is to be achieved by immersing the sheet metal in alkaline base solution degreasing bath. The dipping time is 10-15 minutes at room temperature. The pH value of the alkaline base solution shall be 10-10.5. It removes dirt, grease, oil, like deposits of the dipped parts.

6.4. Cold Water Rinse

Rinse the sheet metal in cold water. The water shall be clean, fresh and continuous overflowing. It removes all loose impurities from the surface.

6.5. De-rusting / Pickling

This is to be achieved by immersing the item in diluted phosphoric base acid. It removes rust from the surface of the sheet metal. The dipping time is 15 to 25 minutes at room temperature. The pH value of phosphoric base acid shall be 2-3.

6.6. Cold Water Rinse

Rinse the sheet metal in cold water. The water shall be clean, fresh and continuous overflowing. This enables to wash out all rust and acid from the surface of the sheet metal.

6.7. After Three tank surface treatment, the sheet metal shall be dried using compressed air.

6.8. After the paint pre-treatment, enclosure shall be painted by oven backed pure polyester powder coating.

6.9. The paint shall be pure polyester, structured finish "Aztech Grey", procured from any of the following preferred make:

- 6.9.1. Jotun
- 6.9.2. Vijay Coat
- 6.9.3. Akzonoble
- 6.9.4. Asian Paints
- 6.9.5. Berger paints
- 6.9.6. Nerolac

6.10. The bidder should own or have assured access (through hire, lease or sub-contract) of the painting facility including shot blasting and / or the 3- tank cleaning process. The bidder shall furnish the details of above facilities along with the offer.

6.11. Dry film paint coating thickness shall be minimum 80 Microns. Purchaser may check coating thickness with their instrument and if coating thickness found less than 80 microns, material shall be liable of rejection.

6.12. Powder Paint shall be of following technical specification :

Sr.	Particulars	Requirements
1	Paint Type	Pure Polyester
2	Shade	Aztec Grey (Structure Finish)
3	Dry Film Thickness (Min.)	80 Microns
4	Adhesion	Cross-cut rating GT 0 (100 % adhesion) (As per requirements of EN ISO 2409)

5	Impact resistance	More than 23 inch-pounds or 2.5 Nm without film cracking (As per requirements of EN ISO 6272 /ASTM D 2794)
6	Salt spray Resistance	No blistering or loss of adhesion after 1000 Hours of salt spray (As per requirements of ASTM B 117)
7	Humidity Resistance	No infiltration exceeding 1 mm on both sides of the scratch after 1000 hours (As per requirements of EN ISO 6270-2)

**7. Marking**

7.1. Danger Plate

- 7.1.1. The danger plates shall comply with requirements of IS 2551-1982.
- 7.1.2. The plate shall be fixed on the cover of Incoming and Outgoing cable compartment with rivets at corners.
- 7.1.3. The danger plate shall be made from aluminum, at least 1.6 mm thick and vitreous enameled white, with letters, figures and the conventional skull and cross-bones in signal red color.

7.2. Indication marking of LIVE with symbol as shown below shall be provided on each cable box cover.



**8. Rating Plates**

- 8.1. The CTs and PTs shall have rating plate engraved with manufacturer name, Year of Manufacture, all technical particulars and in accordance with IS: 2705.
- 8.2. The rating plate shall be made of non-corrosive stainless steel material and indelibly punched. The rating plate to be fixed on the CT & PT and need to be visible from the top after removing the top cover.
- 8.3. The primary terminals shall have CT ratio punched on it at one side and Serial Number on other side. The polarity markings shall also be of permanent nature.
- 8.4. The Rating plates to be fixed at the base of mounting plate of unit in addition to fixing on the CT&PT.

**9. Markings**

9.1. Name Plate of Complete Panel

The 11KV metering cubicles shall have a nameplate that is clearly visible, effectively secured against removal, indelibly and distinctly marked with all essential particulars given below.

- 9.1.1. Name of Manufacturers
- 9.1.2. Address of Manufacturer
- 9.1.3. Year of Manufacture
- 9.1.4. Logo of Purchaser
- 9.1.5. "Property of (Purchase's Name)."
- 9.1.6. Equipment serial no. (16 digit alphanumeric number to be provided by Purchaser)
- 9.1.7. Technical details of CT (Ratio, VA Class, Short Time current, Ref. Indian standard, Insulation level)
- 9.1.8. Serial No. of CT for 3 phases (16 digit alphanumeric number to be provided by Purchaser)
- 9.1.9. Technical details of PT (Ratio, VA Class, Voltage factor, Ref. Indian standard, Insulation level)
- 9.1.10. Serial No. of PT for 3 phases (16 digit alphanumeric number to be provided by Purchaser)
- 9.2. Instruction Notice
  - 9.2.1. Label marked with "Use four lug to lift this unit" shall be pasted at both sides of 11KV metering cubicles near the lifting hook.
  - 9.2.2. Color of letter shall be black and label background with white.
- 9.3. Phase Indication mark
  - 9.3.1. "R, Y, B" letter shall be painted on the wall of cable compartments near the R,Y,B termination links and on the front side of cable compartment cover.
  - 9.3.2. "Incoming and outgoing" shall be painted in red color at the inner base of cable compartments and on the front side of cable compartment cover.
- 9.4. Fastener Torque chart
  - 9.4.1. Standard fastener torque values (Nm) shall be printed on a self-adhesive label and pasted inside the door of metering chamber.
  - 9.4.2. Background of label shall be white and color of letter to be black.
- 9.5. Earth marks labels/plates
  - 9.5.1. Earthing terminals shall be marked in accordance with IEC 417 No. 5017.
- 9.6. Connection diagram

- 9.6.1. Label with connection diagram of metering cubicle shall be pasted inside the door of meter compartment.
- 9.6.2. Background of label shall be white and color of letter to be black.

## **10. Quality assurance**

- 10.1. The manufacturer shall have a well-organized Quality Assurance Plan (QAP) based on ISO 9000 Series to assure that items and services comply with this specification.
- 10.2. The QA Plan shall identify the various stages of manufacture, quality checks to be performed at each stage and the customer hold points. The document shall also furnish details of method of checking, inspection and acceptance, standards / values and get the approval of Purchaser or his representative before proceeding with manufacturing. However, Purchaser or his representative shall have the right to review the inspection reports, quality checks and results of manufacturer's in house inspection department which are not customer hold points and the manufacturer shall comply with the remarks made by Purchaser or his representative on such reviews with regards to further testing, rectification or rejection etc. Manufacturer should submit the list of equipment for testing along with latest calibration certificates to Purchaser.
- 10.3. All design, manufacturing, processing, testing and inspection operations affecting the equipment or material shall be governed by Quality Assurance procedures in accordance with the directives of the ISO 9001 standards.
- 10.4. The Bidder shall invariably furnish following information along with his bid.
  - 10.4.1. 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.
  - 10.4.2. List of tests normally carried out on raw materials in the presence of bidder's representative, copies of test certificates.
  - 10.4.3. Information and copies of test certificates in respect of bought out accessories.
  - 10.4.4. List of manufacturing facilities available.
  - 10.4.5. Level of automation achieved and list of areas where manual processing exists.
  - 10.4.6. List of areas in manufacturing process, where stage inspections are normally carried out for quality control and details of such tests and inspection.
  - 10.4.7. List of testing equipment available with the bidder for final testing of equipment along with valid calibration reports shall be furnished with the bid. The manufacturer shall possess 0.1 class instruments for measurement of losses.

## 11. Documents

The bidders shall furnish the below documents with the offer.

- 11.1. General arrangement drawing showing all components suitably mounted.
- 11.2. Insulating materials to be used for encasing copper bus bars.
- 11.3. Detailed drawings of the terminal block.
- 11.4. Detailed drawings of the 11KV metering cubicles showing the location of the seals to be applied to the make the 11KV metering cubicles intrusion-proof.
- 11.5. The bidder should own or have assured access (through hire, lease or sub-contract) of the painting facility including shot blasting and / or the 3-tank process.
- 11.6. Detailed layout / drawings of the rating and Nameplate.
- 11.7. Quality Assurance Plan (QAP) and Manufacturing Process Plan (MPP).
- 11.8. Name of sub-vendors for the raw materials.
- 11.9. List of standards according to which the raw materials are tested.
- 11.10. List of test normally carried out on raw materials.
- 11.11. Information and copies of test certificates in respect of bought out accessories.
- 11.12. List of equipment for testing along with latest calibration certificates.
- 11.13. Documents for genuine source of EC grade conductivity section and MS sheets.

## 12. Minimum Testing Facilities

- 12.1. The bidder must clearly indicate the details of testing facilities available at the works of manufacturer and the facilities are adequate to carry out all routine tests.
- 12.2. These facilities shall be made available Purchaser's representative whenever needed for witnessing at manufacturer's works.
- 12.3. The bidder shall have following minimum testing facilities.
  - 12.3.1. For CT/PT at original manufacture's works
    - 1.1.1.1. CT Test Setup with current source, burden box and standard CT to measure the accuracy and phase angle error.
    - 1.1.1.2. PT Test Setup with voltage source, burden box and standard PT to measure the accuracy and phase angle error.
    - 1.1.1.3. Partial discharge test setup.
    - 1.1.1.4. HV BDV Tester up to 75 KV.
    - 1.1.1.5. Resistance Voltage Divider.

- 1.1.1.6. High Frequency Generator Set with Control Panel.
- 1.1.1.7. Milli-ohms meter.
- 1.1.1.8. Over voltage, inter turn test equipment.
- 12.3.2. For 11KV metering cubicles
  - 1.1.1.9. Power Frequency Withstand Test Generator Set with Control Panel.
  - 1.1.1.10. Current source for temperature rise test with digital ammeter, voltmeter, temperature indicators and tong tester.

### **13. Inspection and Drawings**

- 13.1. The vendor shall manufacture a prototype 11KV metering cubicles and offer to Purchaser for inspection.
- 13.2. 15 day's advance intimation must be given to Purchaser for organizing the deputation of their representatives to witness the routine inspection mentioned under clause 37.2.
- 13.3. Purchaser can decide upon performing the proto inspection at manufacturer end or give waver/clearance to process with mass production.
- 13.4. Inspection and acceptance shall not absolve the vendor of his responsibility to supply the material in accordance with the specifications/drawings.
- 13.5. On approval of prototype, the supplier shall submit the drawings and get it approved from Purchaser before bulk manufacturing. No additional delivery period will be permitted for approval of prototype and drawings.
- 13.6. The supplier shall furnish the following drawings (in AutoCAD format) along with the offer.
  - 13.6.1. Complete assembly drawings of the 11KV metering cubicles showing plan, elevation and typical sectional views and locations of cable boxes, bus bars, metering compartment, meter etc. with principal dimensions
  - 13.6.2. Foundation plan showing location of foundation channels anchor bolts and anchors, floor plan and openings for cables etc.
- 13.7. Approval of drawings / work by Purchaser shall not relieve the supplier of his responsibility and liability for ensuring correctness and correct interpretation of the drawings for meeting the requirement of the latest revision of applicable standards, rules and codes for practices.
- 13.8. The 11KV metering cubicles shall confirm to latest revisions of relevant standards at the time of ordering and Purchaser shall reject any work or materials, which, in their judgment, is not in full accordance therewith.



- 13.9. In case for series production, the metering 11KV metering cubicles to be 100% checked by vendor at their premises.
- 13.10. Vendor shall keep record of internal inspection/testing and to be submitted whenever demanded.
- 13.11. Routine test report and Final inspection checklist in soft copy form to be E-Mailed to Purchaser QA/QC and hard copy to be attached with invoice copy during the dispatch of 11KV metering cubicles to Purchaser stores.

#### **14. Pre-dispatch inspection**

- 14.1. All acceptance tests and inspection shall be carried out at the place of manufacturer unless otherwise specially agreed upon by the supplier and purchaser at the time of purchases.
- 14.2. The supplier shall give 10 day advance intimation to the purchaser to organize stage and pre-dispatch inspection of the metering cubicle.
- 14.3. The material shall not be shipped before the inspection has been carried out according to the approved quality assurance plan unless otherwise instructed by the purchaser.
- 14.4. The manufacturer shall offer the inspector representing the purchaser all the reasonable facilities free of charge, for inspection and testing, to satisfy him that the material is being supplied in accordance with this specification.
- 14.5. The Metering cubicle shall be subjected to the all the routine/ acceptance test mentioned in this specifications in presence of purchaser's representative at the place of manufacture before dispatch without any extra charges.
- 14.6. To ascertain the quality of raw material the original manufacturer's test report shall be submitted at the time of inspection. The purchaser may test the raw material at the place of manufacture without any extra charges.
- 14.7. Purchaser can test the Metering cubicle by using their own testing instruments at manufacturer's premises.
- 14.8. The acceptance of any material prior to shipment shall in no way relieve the supplier of any of his responsibilities for meeting all the requirements of the Specification and shall not prevent subsequent rejection if such materials are found to be defective.

#### **15. PO MILESTONES**

- 15.1. The supplier to provide the Purchase order execution plan within 7 days from the placement of PO covering followings:
  - 15.1.1. PO Details (No. and Date)
  - 15.1.2. Details of Supplier (Name, Vendor Code)
  - 15.1.3. Material details (code and description)

- 15.1.4. PO Qty and lot wise bifurcation
  - 15.1.5. Documents submission and approval mechanisms
  - 15.1.6. SPOC for PO execution
  - 15.1.7. Escalation Mechanism
  - 15.1.8. Schedule of inspection at customer hold points and Pre-dispatch inspection
- 15.2. The supplier to provide post PO documentation (i.e., drawings / GTP) for approval within 10 days from the placement of the PO.
  - 15.3. Purchaser shall review Documents and provide the comments else approval within 5 working days.
  - 15.4. The supplier shall provide updated documents within 7 days from the receipt of comments from Purchaser.
  - 15.5. Purchaser shall review final set of documents and provides approval within 5 working days after receipt of revised documents.
  - 15.6. The supplier shall offer the inspection at least 7 days in advance for customer hold points as per approved QAP.
  - 15.7. In case any Non-conformance observed during inspection, the supplier the re-offer the inspection within 7 days from inspection.
  - 15.8. The supplier shall intimate respective store in-charge for the delivery in 7 days advance after receipt of MDCC.
  - 15.9. In case any non-conformance observed post supply of the material, the supplier shall visit the site as per following matrix for preliminary assessment or immediate correction action:

Sr	Criticality	Days
1	High	Within 1 day
2	Medium	Within 3 Days
3	Low	Within 7 days

- 15.10. The supplier shall submit the Root cause analysis and CAPA report within 30 days from the report of non-conformance.

## 16. Tests

### 16.1. Type Tests

Type tests shall be carried out on a sample of 11KV metering cubicles to verify compliance with standards. The type tests listed below shall be carried out from laboratories, which are accredited by the National Board of Testing and Calibration

Laboratories (NABL) of Government of India such as CPRI Bangalore / Bhopal, ERDA Baroda. Type tests conducted in manufacturers own laboratory and certified by testing institute shall not be acceptable and frequency of Type test is once in 5 years. For the CTs & PTs, the type tests shall be carried out for each rating of short time withstand current with lowest CT ratio.

16.1.1. For Current Transformer

All tests (except high voltage power frequency wet withstand test) as per clause No. 9.1.1 of IS-2705 (Part-I) 1992, amended up to date, considering outdoor application for CTs.

16.1.1.1. Determination of errors as per requirements of appropriate Accuracy class.

16.1.1.2. High voltage Power Frequency dry withstand Test between Primary and Secondary Windings at 36 kV for 1 min.

16.1.1.3. High voltage Power Frequency dry withstand Test between Secondary Windings and Earth at 3 kV for 1 min.

16.1.1.4. Over voltage inter turn insulation test from secondary side.

16.1.1.5. Verification of terminal marking and polarity test

16.1.1.6. Partial discharge test.

16.1.2. For Potential Transformers

All tests as (except high voltage power frequency wet withstand test) considering outdoor application of PTs.

16.1.2.1. Determination of errors as per requirements of appropriate Accuracy class

16.1.2.2. High voltage Power Frequency dry withstand Test between Sy. Windings and Earth at 3 kV for 1 min.

16.1.2.3. Induced high voltage test on Primary Winding at 200Hz for 30 sec.

16.1.2.4. Verification of terminal marking and polarity test.

16.1.2.5. Partial discharge test.

16.1.2.6. For Complete Unit All tests/checks given below.

16.1.2.7. Visual Inspection

16.1.2.8. GA drawing verification

16.1.2.9. BOM verification

- 16.1.2.10. Continuity test of individual connections to respective equipment and meter.
- 16.1.2.11. Insulation resistance test
- 16.1.2.12. 3kv test for CT and PT circuit
- 16.1.2.13. High voltage test-36 KV between Phase and earth excluding PT circuit
- 16.1.2.14. 6.6 KV between Phase and Earth of PT and measure secondary Voltage
- 16.1.2.15. Rated voltage injection test
- 16.1.3. For Complete Unit
  - 16.1.3.1. Power Frequency withstand Test at 36 kV
  - 16.1.3.2. Impulse Wave Withstand test at 95 kV as per IS: 2071.
  - 16.1.3.3. Type test for IP-55 protection as per category '1'
  - 16.1.3.4. Short time withstand current test of 21KA for 1 Sec.
  - 16.1.3.5. Temperature rise test on complete unit at rated current of 11KV metering cubicles.

**16.2. Routine Tests**

Routine tests shall be carried out on every 11KV metering cubicles at original manufacturer's works to verify compliance with standards and ensure the product performs as designed.

**17. Test Certificates**

Vendors shall furnish the below reports/certificates during ordering.

- 17.1. Test reports for type tests mentioned under clause 17.1.
- 17.2. Test reports for routine tests mentioned under clause 17.2.
- 17.3. Copper conductivity certificate.
- 17.4. Powder coating certificate.
- 17.5. Insulator test certificate.
- 17.6. Test certificate from NABL accredited laboratory for having conducted following tests on the bushings.
- 17.7. Impulse voltage withstand test
- 17.8. Power frequency voltage withstand test
- 17.9. Porosity test

**18. Additional Documentation**

In addition to what specifically mentioned in the specification, the bidders shall provide the following.

- 18.1. Equipments list and its specifications.
- 18.2. Name of sub vendors for the raw materials.
- 18.3. Information and copies of test certificates in respect of bought out accessories.
- 18.4. List of equipment for testing along with latest calibration certificates.
- 18.5. Purchaser Quality shall witness the Routine tests and submit their findings thru Proto Inspection report.
- 18.6. Vendor shall comply with the findings and submit compliance report and If the compliances are found to be satisfactory, Purchaser Quality shall grant clearance/acceptance for the proto.
- 18.7. Purchaser Quality can decide upon performing the proto inspection at manufacturer end or give waver/clearance to precede with mass production.
- 18.8. Proto type acceptance is limited to only physical, dimensions & Operational purpose. Inspection and acceptance shall not absolve the vendor of his responsibility to supply the material in accordance with the specification.
- 18.9. OEM manuals of the 11KV metering cubicles.

#### **19. Packing and Handling**

- 19.1. The 11KV metering cubicles shall reach Purchaser stores in a healthy condition. Therefore, packing need to be done in order to protect the equipment from breakage, damage, environmental impact during handling/transit/storage and work safety.
- 19.2. The lots shall be marked legibly and correctly to ensure safe arrival at their destination.
- 19.3. The supplier shall provide barcode (code-128) of material code (to be provided by Purchaser) on each 11KV metering cubicles.
- 19.4. Possibility of goods being lost or wrongly dispatched because of faulty and faulty illegible markings.
- 19.5. The easily damageable material shall be carefully packed and marked with appropriate caution symbols. Whenever necessary, proper arrangement for lifting, such as lifting hooks etc. shall be provided.
- 19.6. Vendor shall be responsible for any damage to the equipments during transit and delivery because of inadequate and improper packing. Vendor is liable for free replacements of damaged items due to defective or insufficient packing and / or protection inadequate packing.

- 19.7. Loose material can be packed in Polyethylene bags and tagged inside the 11KV metering cubicles.
- 19.8. Plastic packaging made of virgin or recycled plastic, shall not be less than fifty microns in thickness.

## **20. Dispatch**

- 20.1. 11KV metering cubicles covered in this specification shall be delivered to various stores of the Purchaser, Ahmedabad, Surat, and Dahej will be intimated to the successful vendors.
- 20.2. The vendor shall quote delivery periods for various equipments and shall stick to the committed delivery.
- 20.3. It may clearly be noted that the delivery period will under no circumstances be linked up with other formalities.

## **21. Submission of drawings**

Schedule of submission of drawings for approval shall be as under

- 21.1. First submission within 10 days of PO/LOI
- 21.2. Purchaser's comments in 10 days from the receipt of drawings
- 21.3. Supplier to furnish final drawings within next 5 days of commented drawings
- 21.4. Purchaser to send back stamped approved copy within 10 days after receipt of correct drawing.
- 21.5. As built drawing to be submitted within 7 days of final inspection

## **22. Deviations**

The bidders are not allowed to deviate from the principal requirements of the specifications. However, the bidder is required to submit detailed list of all deviations without any ambiguity. Unless otherwise brought out separately by the bidder in the schedule of deviations, the energy Fuses offered shall conform to the specification scrupulously. The discrepancies between the specification and the catalogues or literature submitted as part of the offer shall not be considered as valid deviations unless specifically brought in the schedule of deviations.

**Annexure-A**  
**Guaranteed Technical Parameters**

1. Name of Manufacturer :
2. Address of Manufacturer :
3. System parameters
  - 3.1. Normal system voltage : 11KV
  - 3.2. System highest voltage : 12KV
  - 3.3. System frequency : 50Hz
  - 3.4. Method of earthing : Non-effectively earthed system
4. Power Supply Variation
  - 4.1. Voltage : 10% to +10% Vref
  - 4.2. Frequency : 47.5 Hz to 52.5 Hz
  - 4.3. Power factor : Zero (Lag) – Unity – Zero (Lead)
5. Insulation Level
  - 5.1. Highest Continuous System Voltage :
  - 5.2. Power frequency Voltage :
  - 5.3. Impulse Voltage(KVp) :
6. Cubicle
  - 6.1. Overall dimension of cubicle (mm) with detailed drawing in PDF & Auto cad. :
  - 6.2. Material of cubicle :
  - 6.3. Service type :
  - 6.4. Construction type :
  - 6.5. Interlock arrangements :
  - 6.6. Ingress Protection(IP) :
  - 6.7. Details of arrangement for earthing :

- 6.8. Thickness of Plates(mm) :
- 6.9. Lifting arrangement details :
- 6.10. Paint shade for external and internal :
- 6.11. Paint material and thickness :
- 6.12. Sealing arrangement details :
- 6.13. Hardware material and Grade :
- 6.14. Surface finish of hardware :
- 6.15. Overall Panel Weight(Kg) :
- 7. Current Transformer
  - 7.1. Make of CT :
  - 7.2. Basic insulation level :
  - 7.3. Type :
  - 7.4. Insulation class :
  - 7.5. Rated Voltage :
  - 7.6. Rated primary current :
  - 7.7. Rated secondary current :
  - 7.8. Rated continuous thermal current :
  - 7.9. Accuracy class :
  - 7.10. Burden :
  - 7.11. Instrument security factor :
  - 7.12. Power frequency withstand voltage :
  - 7.13. Impulse voltage withstand capacity :
  - 7.14. Short circuit withstand Current and Duration :
  - 7.15. (KA rms/Sec)



- 7.16. Temperature rise(Maximum) :
- 7.17. Rated dynamic withstand current(KA) :
- 8. Potential transformer
  - 8.1. Make of PT :
  - 8.2. Basic Insulation level :
  - 8.3. Type :
  - 8.4. Insulation Class :
  - 8.5. Rated Voltage :
  - 8.6. Rated Primary Voltage :
  - 8.7. Rated Secondary Voltage :
  - 8.8. Accuracy class :
  - 8.9. Burden :
  - 8.10. Voltage Factor :
  - 8.11. Power Frequency withstand voltage :
  - 8.12. Impulse voltage withstand capacity :
  - 8.13. Temperature rise (Maximum) :
- 9. Bushings
  - 9.1. Make of bushing :
  - 9.2. Material of bushing :
  - 9.3. Rating & Type :
- 10. Bus bars
  - 10.1. Material & Grade :
  - 10.2. Surface finish :
  - 10.3. Bus bar size :

- 10.4. Bus bar insulation :
- 10.5. Bus bar clearances :
- 11. Test Terminal Block
  - 11.1. Make & Type :
  - 11.2. Terminal hole size :
  - 11.3. Material of terminal cover :
- 12. FRLS cables
  - 12.1. Make :
  - 12.2. Voltage Grade :

**SOURCE OF MATERIALS / MANUFACTURER OF BELOW ITEMS**

(The bidder shall fill the sheet for each size of transformer)

<b>Sr.</b>	<b>Description</b>	<b>Source</b>
1.	CRGO Lamination for CT &PT	
2.	Copper Conductor	
3.	MS Sheet/Angles/Channels	
4.	Insulated Winding Wires	
5.	Gaskets	
6.	HV Bushings	
7.	Paint	

**LIST OF DOCUMENTS**

(The bidder shall submit the below documents for each size of transformer)

<b>Sr.</b>	<b>Type of Document</b>	<b>Document No</b>
1.	Outline general arrangement drawing of 11KV metering cubicles	
2.	Details of fittings.	
3.	Rating and diagram plate	
4.	Drawing showing constructional details and dimensions of bushings, cable box, Metering compartment, CT/PT compartment, CT & PT	
5.	Weight of individual component & total weight	
6.	Foundation drawing of 11KV metering cubicles	