

MATERIAL SPECIFICATIONS CELL

TECHNICAL SPECIFICATION

11 KV INDOOR / OUTDOOR & 22 KV / 33 KV OUTDOOR

METERING CUBICLE



TECHNICAL SPECIFICATION NO.

CE/QC-T/MSC-II, Date: 29.08.2019



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1.00 SCOPE

- 1.01 This specification covers the design, fabrication, painting and supply of metal cabinet, supply of components, wiring, testing at works, packing and supply on destination basis and performance testing of 11 kV, 22 kV & 33 kV self-equipped metering cubicle. The HT Static TOD Tri-vector meter is not in the scope of supply. The metering cubicle shall be suitable for indoor / outdoor application.
- 1.02 It is not the intent to specify herein all the complete details of the design and construction of equipments. However, the equipment shall conform in all respects to high standards of engineering, design and workmanship mentioned in clause 5.00 and shall be capable of performing continuous commercial operation upto the supplier's guarantee in a manner acceptable to the purchaser, who shall interpret the meanings of drawings and specification and shall have the power to reject any work or material which in his judgment, is not in accordance therewith. The equipments offered shall be complete with all components necessary for their effective and trouble free operation. Such components shall be deemed to be within the scope of supplier's, irrespective of whether those are specifically brought out in this specification and / or the commercial order or not.

2.00 SPARES

The tenderer shall quote unit rates for the spares. The purchaser reserves the right of selection of items and quantities of these spares to be ordered. The costs of such spares shall not be considered for tender evaluation.

3.00 System Particulars:-

3.1	Nominal System Voltage	:	11kV. 22kV, 33kV
3.2	Voltage variation on supply side	:	±10 %
3.3	Corresponding Highest System Voltag	e:	12kV, 24kV, 36kV
3.4	Frequency	:	50 Hz with ±3 % tolerance
3.5	Transient condition	:	-20 % or + 10 % combined
		va	ariation of voltage and frequency.
3.6	Number of Phase	:	3 Phases
3.7	Neutral earthling	:	Solidly earthed.

4.00 SERVICE CONDITIONS

- (i) Location Any where in the state of Maharashtra
- (ii) Maximum altitude above mean sea level- 1000 mtrs

(iii)	Maximum ambient average temp.	- 50ºC.
(iv)	Maximum temperature in shade	- 45ºC.
(v) Mir	nimum air temperature in shade	- 3.5°C.



(vi)	Relative humidity	- 10-100%
(vii)	Maximum annual rainfall	- 1450 mm
(viii)	Maximum wind pressure	- 150kg/ mm ²

- (ix) Seismic level (Horizontal acceleration) (as per IS1893) 0.3 g
- (x) Isoceraunic level 50 (days/year)
- (xi) Climate Moderately hot, humid, tropical, conducive to rust and fungus growth.
- (xii) The highest temperature in the cubicle may go up to 85°C

5.00 STANDARDS

Unless otherwise specified elsewhere in this specification, the rating, performance and testing of the metering cubicle and accessories shall conform to the latest revisions, available at the time of submission of tender of all relevant standards listed in Annexure - I

6.00 PRINCIPAL PARAMETERS

The equipment covered in this specification shall meet the technical requirements listed in Annexure - II.

7.00 GENERAL TECHNICAL REQUIREMENTS

7.01 GENERAL ARRANGEMENT

The metering cubicle shall be installed electrically in between the incoming supply point and the Distribution transformer of consumer's installation. The general arrangement of the cabinet shall be as per the enclosed drawing and final drawing approval has to be obtained after approval of prototype sample, as mentioned at clause 14.00. As shown in the general arrangement drawing, the metering cubicle shall be provided with following components suitably mounted:

- 1. 3 Nos. 11/22/33 kV level current transformers (CTs).
- 2. 3 Nos. 11/22/33 kV level Potential transformers (PTs).
- 3. Tinned copper bus-bars totally covered by HT insulating sleeves.
- 4. The secondary wires from the terminals of CTs & PTs in the CT / PT compartment shall be covered by resin cast blocks and the secondary wires shall be brought in the metering compartment through rubber bush and shall be left open with sufficient spare length.
- 5. Resin cast bushing board/s with arrangement to receive standard reputed type of cable terminations for incoming and outgoing supply points.



- 6. Adequate number of PVC cable glands to receive purchaser's incoming and / or outgoing cables with suitable cable clamping arrangement at incoming & outgoing of cubicle.
- 7. Electronic safety lock (optional).

The principal parameters of all the above said components are listed in Annexure - II and the general technical requirements are described hereinafter.

7.02 CONSTRUCTIONAL FEATURES OF THE CABINET

The metering cubicle shall consist of four metal enclosed compartments as follows:

(a) CT/PT Compartment	1 No.
(b) Cable termination compartment	2 Nos.
(c) Meter compartment	1 Nos.

7.03 General Technical Requirements of Current Transformers:-

a) Resin Cast Assembly :-

The Resin Cast assembly shall be of a single piece construction without any joint or coupling.

b) Insulation Material :-

Insulation Material used for Current Transformer should be Epoxy Resin Cast having Insulation Class E. The insulation of the Current Transformers shall be so designed that the internal insulation shall have higher electrical withstand capability than the external insulation. The dielectric withstand values specified in this specification are meant for fully assembled Current Transformer. The temperature rise on any part of equipment shall not exceed the maximum temperature rise limits specified in relevant IS.

c) Earthing :-

The Current Transformer shall be provided with Two separate Earthing Terminals for bolted connection to MS flat. The size of two numbers of Earthing Terminals shall be 12 mm dia. x 30 mm length, Hot Dip Galvanized with one plain washer and one nut.

d) Name Plate and Rating Plate:-

The Current Transformer shall be provided with non-corrosive, legible Name plate, with the information specified in relevant standards, duly engraved / punched on it. The Current Transformer shall be provided with a rating plate with dimensions and marking as per IS – 16227. The markings shall be punched and not painted. The serial number and code of the supplier shall also be punched on the



Current Transformer to identify the unit in case of loss or damage to the rating plate.

e) Mounting Details :-

Mounting details for fixing the Current Transformer on supporting base channel shall be strictly in accordance with the specified details as follows:

The holes for mounting of CT shall be oval shaped with 12mm diameter.

Base Frame hole mounting centre to centre distance (mm) should be as below:

- a) For 11 kV CT : 285(L) x 140(W)
- b) For 22 kV CT : 340(L) x 170(W)
- c) For 33 kV CT : 360(L) x 170(W)

f) Primary Winding :-

- i)Primary winding shall be Wound Type. The primary winding conductor shall be high conductive (electrolytic grade) copper without any joint. Type of insulation used shall be described in the offer. For Primary Winding, current densities shall not exceed the limit 1.6 A/Sq.mm. for highest current ratio.
- ii) Enamel, if used for conductor insulation, shall be either polyvinyl acetate type or amide type and shall meet the requirements of IS 4800. Polyester enamel shall not be used.
- iii) The design density for short circuit current as well as conductivity of the metal used for primary winding shall meet the relevant requirement of IS: 16227-2016.
- iv) The bidder shall, in his offer furnish detailed calculations for selection of winding cross sections. The cross section area of Primary Winding, cross section area of Secondary Winding, number of Primary Turns, number of Secondary Turns, Current Density etc. shall be mentioned by the bidder. The rating and the diagram plates should indicate the connection arrangement / diagram.
- v) The Primary Winding shall be designed for extended primary current at 120% of rated primary current.

g) Secondary Winding :-

- i)Suitably insulated copper wire of electrolytic grade shall be used for Secondary Windings. Type of insulations used shall be described in the offer. The cross section area of Secondary Winding, number of Secondary Turns, Current Density etc. shall be mentioned by the bidder.
- ii) The excitation current of the CT shall be as low as possible. The bidder shall furnish, along with his offer, the magnetizing curves for all the cores.



h) Primary Terminals :-

The primary Terminal shall be of heavily tinned electrolytic copper of 99.9% conductivity. The minimum thickness of tinning shall be 15 microns. C.T.

i) Secondary Terminals :-

Secondary Terminals shall be provided with two studs having size M6X10 with safety acrylic cover.

7.04 General Technical Requirements of Potential Transformers:-

a) Resin Cast Assembly :-

The Resin Cast assembly shall be of a single piece construction without any joint or coupling.

b) Insulation Material :-

Insulation Material used for Potential Transformer should be Epoxy Resin Cast having Insulation Class E. The insulation of the Potential Transformers shall be so designed that the internal insulation shall have higher electrical withstand capability than the external insulation. The dielectric withstand values specified in this specification are meant for fully assembled Potential Transformer. The temperature rise on any part of equipment shall not exceed the maximum temperature rise limits specified in relevant IS.

c) Earthing :-

The Potential Transformer shall be provided with Two separate Earthing Terminals for bolted connection to MS flat. The size of two numbers of Earthing Terminals shall be 12 mm dia. x 30 mm length, Hot Dip Galvanized with one plain washer and one nut.

d) Name Plate and Rating Plate:-

The Potential Transformer shall be provided with non-corrosive, legible Name plate, with the information specified in relevant standards, duly engraved / punched on it. The Potential Transformer shall be provided with a rating plate with dimensions and marking as per IS – 16227. The markings shall be punched and not painted. The serial number and code of the supplier shall also be punched on the Potential Transformer to identify the unit in case of loss or damage to the rating plate

e) Mounting Details :-

Mounting details for fixing the Potential Transformer on supporting base channel shall be strictly in accordance with the specified details as follows:



The holes for mounting of PT shall be oval shaped with 12mm diameter.

Base Frame hole mounting centre to centre distance (mm) should be as below:

- a) For 11 kV PT : 280(L) x 190(W)
- b) For 22 kV PT : 310(L) x 205(W)
- c) For 33 kV PT : 405(L) x 230(W)

f) Winding :-

Suitably insulated copper wire of electrolytic grade shall be used for Secondary Windings. Type of insulation used shall be described in the offer.

g) Primary Terminals :-

The primary Terminal shall be of heavily tinned electrolytic copper of 99.9% conductivity. The minimum thickness of tinning shall be 15 microns. C.T.

h) Secondary Terminals :-

Secondary Terminals shall be provided with two studs having size M6X10 with safety acrylic cover.

7.05 CT / PT COMPARTMENT

- 7.05.1.1 3 nos. of CTs & 3 nos. of PTs shall be mounted in this compartment. Resin cast bushings of suitable size, strength & rating shall be provided on the two sides leading to two cable compartments. PT's are to be fixed on incoming side after that CT's shall be fixed keeping suitable distance as shown in drawing.
- 7.05.1.2 The inside terminals of the resin cast bushings, the primary terminals of CTs and primary terminals of PTs shall be connected to 25 mm X 6 mm size busbar of electrolytic grade tinned copper. All the terminals and busbar shall be covered by insulating sleeves so that no HT part is accessible. For cubicles having primary current more than 250 A, size of the bus bar shall be 25 mm x10 mm
- 7.05.1.3 The secondary wiring of CTs & PTs shall be carried out by 1100 V grade multi-stranded single core copper wire. Size of copper wire shall be 4 mm² for CTs & 2.5 mm² for PTs. Other end of these wires shall be brought to the meter compartment with sufficient spare length for connection to the energy meters. Entire wiring of cubicle except in the meter compartment shall be covered in rectangular box type PVC conduit so as to avoid the scattering of wires.
- 7.05.1.4 The CTs & PTs with base frame attached shall be firmly mounted on 75 x 40 x 5 mm base channel in CT and PT compartment. Additional support if necessary may be provided for mounting CT / PT so as to have the bushing



terminals, CT primary terminals & PT primary terminals are at same horizontal level i.e. Busbar level.

The distance between Busbar bottom surface to mounting channel upper surface shall be as below:

- i. 11kV CT : 251mm
 - 11kV PT: 251mm
- ii. 22kV CT : 295mm
 - 22kV PT: 295mm
- iii. 33kV CT : 383mm
 - 33kV PT: 383mm
- 7.05.1.5 The CT / PT Compartment shall be provided with detachable top cover having 5 to 10 degree slope from the front to rear side with the canopy on front side.
- 7.05.1.6 The detachable top cover shall be provided with suitable interlock so that the same cannot be opened without opening the door of the meter compartment.
- 7.05.1.7 As the CTs / PTs incorporated in the cubicles are of resin cast type, ventilation for sufficient air circulation shall have to be provided. This shall be done by providing 2 Nos. air-vent pipes with small holes on plugged part bended downwards suitably as shown in the drawing.
- 7.05.1.8 The distance between live part of busbar to earth shall be minimum 190 mm.
 - 7.05.2 **CABLE COMPARTMENTS.**
- 7.05.2.1 Cable compartments for housing purchaser's cable / cable terminations shall be provided on both sides.
- 7.05.2.2 Detachable gland-plates shall be provided at the bottom side of this compartment for accommodating 11 / 22 / 33 kV XLPE, 3 core cables (120 mm² to 300 mm²).
- 7.05.2.3 Detachable covers shall be provided on sides of these compartments and the roof shall be sloping 5 to 10 degrees towards the ends with canopy.
- 7.05.2.4 Two Nos. of danger boards of M.S. plate shall be provided as per IS: 2551.

7.05.3 **METER COMPARTMENT.**

7.05.3.1 Meter compartment with front door shall be provided on front side of the CT / PT compartment. The size of the compartment should be such that it can accommodate the HT ERSS Meter & Meter Testing equipment during load test. The minimum depth of the compartment should be 350 mm.



- 7.05.3.2 The rubber gaskets shall be provided on stationary part of the compartment so that edges of door shall rest on it.
- 7.05.3.3 The door shall be provided with Godrej-Ultra lock (Latch type).
- 7.05.3.4 The door shall be provided with non-resettable mechanical impulse counter to monitor the number of times the door has been opened.
- 7.05.3.5 The door shall be supported by strong, heavy duty concealed type (hinges shall not be accessible from outside) hinges.
- 7.05.3.6 Toughened glass over grilled window of size 200 x 200 x 5 mm mm for easy viewing the energy meter shall be provided. The glass shall be provided with suitable weather proof seal to prevent ingress of rain water and any screws, bolts and nuts for fixing the glass shall not be accessible from outside. Hinged metal cover to the glass window shall be provided to shield the glass from sun rays and mechanical damages.
- 7.05.3.7 The metering compartment shall be provided with 'Heatlon' lining through out the compartment.
- 7.05.3.8 Roof of the metering compartment shall be slopping 5 to 10 degrees towards front side with canopy.
- 7.05.3.9 The letters 'M.S.E.D.C.L.' of suitable size with 100 mm height shall be punched / embossed on front side door.
 - 7.05.4 **GENERAL FEATURES**
- 7.05.4.1 The metering cubicle shall comprise of rigid welded structural frame enclosed completely by M.S. sheets of not less than 2 mm thickness. Structural frame and supporting angles shall be of M.S. angle of size 50 x 50 x 6 mm minimum. All the compartments of the cubicle shall be welded from inside and detachable covers / components shall be bolted. Bolts with hole shall be provided for sealing purpose at opposite corners of the top cover as well as side covers. The fabrication of the cubicle shall be such that there is no ingress of water.
- 7.05.4.2 All doors and removable covers (2 no. I/C & O/G compartment) shall be provided with neoprene gasket 25 mm wide all around them. The top cover shall be provided with cork gasket with the width equal to the width of cover / flange of CT/PT compartment and the metering cubicle shall meet the requirements of IP 55 protection as per IS 12063, if the air–vents are closed.
- 7.05.4.3 The height of metering cubicle shall be such that, the meter window be at normal eye level. A bottom frame of M.S. angles as shown in the drawings shall be provided, duly welded, for mounting the cubicle on the plinth.
- 7.05.4.4 The holes for mounting of CT and PT shall be oval shaped with 12mm diameter.



Base Frame hole mounting centre to centre distance (mm) should be as below:

- d) For 11 kV CT: 285(L) x 140(W)
- For 11 kV PT : 280(L) x 190(W)
- e) For 22 kV CT : 340(L) x 170(W)
 For 22 kV PT : 310(L) x 205(W)
- f) For 33 kV CT : 360(L) x 170(W)

For 33 kV PT : 405(L) x 230(W)

Distance between base channels centre to centre should be as below:

- i) For 11 kV CT : 285mm
 - For 11 kV PT : 280mm
- ii) For 22 kV CT: 340mm
 - For 22 kV PT : 310mm
- iii) For 33 kV CT: 360mm
 - For 33 kV PT: 405mm
- 7.05.4.5 2 nos. of lifting hooks each of suitable size shall be provided suitably at the top of incoming & outgoing compartment for lifting the cubicle.
- 7.05.4.6 The metering cubicle shall be painted by powder coating after proper cleaning. The colour shall be 'Light Gray' 631 as per IS : 5. Finished painted appearance of equipment shall present an aesthetically pleasing appearance, free from dents and uneven surfaces.
- 7.05.4.7 In order to avoid rusting, automobile grade painting or suitable anticorrosive paint shall be done to cubicle.
- 7.05.4.8 For vertical type metering cubicle, the incomer cables shall enter from the bottom of kiosk/cubicle and outgoing cables shall be drawn out from bottom of kiosk/cubicle as well (The drawing submitted shall be as per drawing of vertical type cubicle attached with specification).
- 7.05.4.9 Silica gel bags to be provided inside the compartment to absorb moisture to avoid flashover.

8.00 EARTHING

- 8.01 Five independent G.I. earthing bolts of minimum M 10 size shall be provided on sides so that the inside and outside earthing can be done. It shall be firmly welded to the sides.
- 8.02 An earthing bus of copper strip of size 25 x 3 mm shall be provided and extended throughout the length of the metering cubicle. It shall be bolted / brazed to the framework at two points. PT primarily earthing may be made at 2 locations by 25 x 3 mm copper strips.



- 8.03 All non-current carrying metal work of the Metering cubicle shall be efficiently bonded to the earth bus.
- 8.04 Hinged doors shall be earthed through flexible earthing braid.

9.00 CABLE GLANDS

The sizes of 11 / 22 / 33 kV power cable being arranged by the purchaser for incoming and / or outgoing supply shall be 120 mm² to 300 mm² 3 core XLPE cables. The bidder shall provide connecting leads of adequate size with terminal clamps for connecting cable terminals to bus-bars. The arrangements shall be suitable for double bolt connection as shown in the drawing. Two sets of one plain washer and one cup washer and two nuts and one bolt shall be provided for the purchasers incoming / outgoing cable connections. The bidder's scope shall also include necessary number of heavy duty PVC cable glands for terminating 11 / 22 / 33 kV power cables.

10.00 TRANSFORMERS

10.01 **INSTRUMENT TRANSFORMERS.**

- 10.01.1 The current transformers (CTs) and potential transformers (PTs) shall conform to the requirement stipulated in relevant standards as well as in Annexure II.
- 10.01.2 The CTs & PTs shall be of cast resin type (Insulation Class 'E') and the design and dimensions shall be universal irrespective of class so that any CT/PT can be easily replaced irrespective of manufacturer. CT/PTs shall be able to withstand the thermal and mechanical stresses resulting from the maximum short circuit & momentary current ratings specified. These shall be completely encapsulated. The resin used for manufacturing of CT / PT and Bushing Board shall be of reputed make and resin casting shall be carried out under vacuum by hot setting process only. During this process porosity in the resin casting shall be strictly avoided to get the better results of CT/PT operations. HT insulating sleeves of reputed make shall be used for HT busbar.

HT insulating sleeves is developed by making use of cross linked, flame retardant and track resistant polyolefin. It is completely resistant to splitting.

- 10.01.3 CTs / PTs shall have polarity marks indelibly embossed on each transformer and at the associated terminal block.
- 10.01.4 CTs / PTs shall be of single phase/ single ratio type.
- 10.01.5 Core lamination shall be of high grade steel or other equivalent alloy.
- 10.01.6 Name plate showing particulars and connection diagram shall be provided. Name plate shall be made of non-corrosive material & shall be



indelibly punched / painted and shall be firmly fixed on the body of instrument transformer.

- 10.01.7 The size and dimensions of CTs & PTs shall be strictly as per the enclosed drawing.
- 10.01.8 The CTs & PTs shall be suitable for floor mounting in the cubicle.
- 10.01.9 The primary terminals of CT shall be on top of CT and it should be threaded type.
- 10.01.10 The primary terminal of PT shall be on top of PT and it should be threaded type.
- 10.01.11 Size of primary terminals of CT & PT shall be M10 and above as per CT ratio and size of outgoing secondary terminals of CT & PT shall be M6.
- 10.01.12 The class of accuracy for CT's & PT's for various ratios at various voltage level is given in table below.

Sr. No.	Voltage & Current Rating	Class of accuracy of CT	Class of accuracy of PT
1.	11 KV : 5, 10, 25 & 50/5 A	0.5 S	0.5
2.	11 KV : 75/5A, 100/5 A, 200/5A, 300/5 A	0.2 S	0.2
3.	22 KV: 5, 10, & 25/5 A	0.5 S	0.5
4.	22 KV : 50 /5 A, 100/5A, 200/5 A, 300/5 A	0.2 S	0.2
5.	33 KV : 50/5 A, 100/5A, 200/5 A, 300/5 A, 400/5 A & above	0.2 S	0.2

10.01.13 The PT ratios are as follows :

For 0.2S Class of Accuracy of CT the relevant Class of Accuracy for PT shall be 0.2. For 0.5S Class of Accuracy CT the relevant Class of Accuracy for PT shall be 0.5.

10.02 ELECTRONIC LOCK (OPTIONAL)

A dynamic electronic locking system for the cubicle shall be offered as optional item. The dynamic lock shall consist mainly of -

(a) MASTER UNIT with LCD to programme REMOTE at purchaser's office,

(b) Portable REMOTE with KEYBOARD to operate the door of the panel lock.

(c) PANEL LOCK with sensor to lock / unlock door of cubicle.



MASTER UNIT

The unit shall contain LCD display and a socket to connect REMOTE, when powered, it shall show current date and time. The clock for this purpose shall be simple but tamper proof clock. Once connected to REMOTE using cable, the lock shall open only when ID of MASTER matches with that of REMOTE.

The REMOTE shall be programmed for specific panel lock only. The secret code for transmission shall be complete and shall not follow normal arithmetic rules. Random codes shall be generated which shall be unique for specific lock. The secrete code shall be a function of that particular date so that once a REMOTE is programmed; it shall be effective only for certain hours say end of the day.

Transmission of secret code of PANEL LOCK shall be done on dual transmission technique i.e. Infra Red (IR) and Radio Frequency (RF) encoding, using these two techniques coupled with Random Code generation technique mentioned above shall provide the secret code system which cannot be broken.

REMOTE

A REMOTE of simple design having a keypad as in the telephone instrument shall be provided.

The REMOTE shall have a unique ID code to have dialog with MASTER. Once programmed the REMOTE shall be useful for operating PANEL LOCK for that particular day only.

PANEL LOCK

The PANEL LOCK shall consist of an RF & IR sensor and motorised mechanical lock. The motor of the mechanical lock shall be operable at 230 +/- 10% volt single phase A.C. power supply. The lock shall have minimum 4 Nos. of cylinders of 14mm diameter which shall engage the cubical door. The sensor shall also indicate power on / off and status of lock. The MASTER and the REMOTE shall be programmable / usable for number of PANEL LOCKS - the limitations, if any, may be specified by the bidders. Any other techno-economical acceptable alternative designs shall be considered but indenter / purchaser shall be final authority in this regard.

11.00 TESTES & TEST CERTIFICATE

11.01 ACCEPTANCE AND ROUTINE TEST

Following tests shall be carried out as acceptance and routine tests.

11.01.1 For Current Transformers

All tests as per clause No.7.1.2 of IS – 16227 (Part-II) 2016 amended up to date.



11.01.2 For Potential Transformers

All tests as per clause No. No.7.1.2 of IS – 16227 (Part-III) 2015 amended up to date.

11.01.3 **For Complete Unit**

- i) Power frequency withstand test at 28 kV, 50 kV and 70 kV for 11 kV, 22 kV and 33 kV cubicles respectively.
- ii) Overall dimensions

For CTs and PTs, required tests shall be carried out at the works of original manufacturer's in presence of purchaser's representative.

11.02 **TYPE TESTS**

For the CTs and PTs, the type tests shall be carried out for each voltage class and for each rating of short time withstand current with lowest CT ratio.

11.02.1 **For Current Transformer**

All tests as per clause No.7.1.2 of IS – 16227 (Part-I) 2016 & as per clause no. 7.1.2 of IS – 16227 (Part-II) 2016 amended up to date, considering outdoor application of CTs.

11.02.2 For Potential Transformer.

All testes as per clause No.7.1.2 of IS – 16227 (Part-I) 2016 & as per clause no. 7.1.2 of IS – 16227 (Part-III) 2015. amended up to date, considering outdoor application of PTs.

11.02.3 **For Complete Unit**

- Temperature rise test on complete unit at the rated current of cubicle of each voltage class with highest C.T. ratio. (IS 3427 (1997)).
- Power Frequency Withstand Test at 28 kV, 50kV and 70kV for 11kV, 22kV and 33 KV cubicles respectively.
- Impulse Wave Withstand test at 75 kV, 125 kV & 170 kV for 11 kV, 22 kV and 33 kV cubicles (considering that the cubicles are meant for outdoor use) as per IS-2071.
- Type test for IP-55 protection as per category '1' as mentioned as per clause no. 7.5 of IS 12063.
- Short time withstand current test, shall be performed on the cubicle by passing a current of 13.1 KA for 1 Sec. for 11 kV and 26.2 KA for 1 sec. for 22 kV / 33 kV with CT / PT bypassed. (IS 3427-1997).

11.03 **TYPE TEST REPORTS**

The HT Metering cubicles, CTs and PTs shall be fully type tested as per relevant IS and this specification. The tenderer shall furnish detailed type



test reports of all the type tests for offered CTs, PTs and HT Metering Cubicles. For these CTs & PTs, the type tests shall be for each voltage class and for each rating of short time current. These tests shall have been carried within 5 years prior to the date of submission of type test reports. The TTR shall have to be submitted along with offer alternatively if the relevant type test are not available with bidder same shall be submitted before commencement of supply. This being considered as the class of accuracy of CT's & PT's have been changed from 0.5 to 0.5S up to 1000 KVA and 0.2S above 1000 KVA. However the bidder has to submit the recent TTR available for 0.5 class / 0.2 Class with them as proof of being manufacturing the CT's/PT's & metering Cubicle. The purchaser reserves the right to demand repetition of some or all TTRs in presence of purchaser's representative at purchaser's cost. In case the unit fails in any one type test, the complete supply shall be rejected.

All above type tests shall be carried out at NABL Laboratories to prove that the complete HT Metering Cubicles, CTs and PTs offered meet the requirements of specification. The successful bidder shall take approval / waival of type tests from the Chief Engineer, Testing and Quality Control, MSEDCL, Mumbai prior to commencement of supply.

12.00 MINIMUM TESTING FACILITIES

The Bidder must clearly indicate the details of testing facilities available at the works of manufacturer and that the facilities are adequate to carry out all routine and acceptance tests. These facilities shall be available to MSEDCL's Engineers, if deputed to carry out or witness the tests at the manufacturer's works.

12.01.1 **For CT/PT at original manufacturer's works**

- Class of accuracy test panel for CTs with phase angle and ratio error measuring unit with Current source, Burden box and standard CT.
- Class of accuracy test panel for PTs with phase angle and ratio error measuring unit with Voltage source, Burden box and standard PT.
- Partial discharge test setup.
- Resistance Voltage Divider.
- High Frequency Generator Set with control panel.
- Mili-Ohms Meter.
- Over voltage inter turn test equipment

12.01.2 **HT Metering Cubicle**

Power Frequency Withstand Test Generator Set with control panel.



• Current source for temperature rise test with digital ammeter, volt meter, temperature indicators and Tong Tester.

13.00 MINIMUM MANUFACTURING FACILITIES

The Bidder shall have following minimum manufacturing facilities in house to prove his reliability as a manufacturer of HT Metering Cubicle.

- a. Power operated shearing machine.
- b. Power operated press brake.
- c. Power operated press.

The tenderer shall furnish details of Powder Coating process employed.

14.00 PROTOTYPE AND DRAWING

The successful bidder shall have to offer a prototype sample for inspection before bulk manufacturing. The prototype sample shall be inspected by a team of purchaser's representatives.

On approval of prototype, the bidder shall have to submit all the detailed drawings accordingly and get it approved from Chief Engineer, MSEDCL, Testing and Quality Control, 5th Floor, Prakashgad, Mumbai - 400051 before bulk manufacturing and supply.

No additional delivery period shall be permitted for approval of prototype and drawings.

15.00 INSPECTION

The inspection may be carried out by the purchaser at any stage of manufacture. The successful bidder shall grant free access to the MSEDCL's representative at a reasonable time when the work is in progress.

Inspection and acceptance of any equipment under this specification by the purchaser shall not relieve the supplier of his obligation of furnishing equipment in accordance with the specification and shall not prevent subsequent rejection if the equipment is found to be defective.

16.00 AFTER SALES SERVICE

The supplier shall agree for services after sales & to supply recommended spares like single core resin cast CTs & PTs of specific ratings with base frame attached with CTs & PTs as and when required by MSEDCL after guarantee period.

17.00 DOCUMENTATION

17.01 The bidder shall furnish two sets of following drawings and documents along with his offer.



- Complete assembly drawings of the metering cubicle showing plan, elevation and typical sectional views and locations of cable boxes, busbars, metering compartment and TV meter.
- Foundation plan showing location of foundation channels, anchor bolts and anchors, floor plan and openings for cables etc.
- Type test certificates for type testing of bought out items, if already carried out.
- Descriptive pamphlets and literature of bought out items including CT characteristic curves etc.
- 17.02 All drawings and data shall be annotated in English.
- 17.03 Successful bidder shall be required to furnish four sets of final versions of all the above said drawings and documents within 15 days after Proto type inspection, for purchaser's approval.
- 17.04 Approval of drawings / work by purchaser shall not relieve 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. The equipment 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 power to reject any work or materials which, in his judgment, is not in full accordance therewith.

18.00 PACKING & FORWARDING

- 18.01 The equipments shall be packed in crates suitable for vertical / horizontal transport, as the case may be, and suitable to withstand handling during transport and outdoor storage during transit. The supplier shall be responsible for any damage to the equipment during transit due to improper and inadequate packing. The easily damageable material shall be carefully packed and marked with appropriate caution symbols. Wherever necessary, proper arrangement for lifting, such as lifting hooks etc. shall be provided. Any material found short inside the packing cases shall be supplied by supplier without any extra cost.
- 18.02 Each consignment shall be accompanied by a detailed packing list containing the following information.
 - a. Name of the consignee.
 - b. Details of consignment.
 - c. Destination.
 - d. Sign showing upper/lower side of the crate.
 - e. Handling and unpacking instructions



- f. Bill of material indicating contents of each package.
- 18.03 The supplier shall ensure that the packing list and bill of material are approved by the purchaser before dispatch.

19.00 SCHEDULE.

19.01 The tenderer shall fill in the following schedules which form part of the tender specification and offer. If the schedule are not submitted duly filled in with the offer, the offer shall be liable for rejection.

Schedule -'A' - Guaranteed and technical particulars.

Schedule - 'C' - Tenderer's Experience

19.02 Unless otherwise brought out separately by the tenderer, the equipment offered shall be claimed to 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 unless specifically brought out.



<u>ANNEXURE – I</u>

LIST OF APPLICABLE STANDARDS

<u>SR. NO.</u>	STANDARD NO.	<u>TITLE</u>
(1)	IS – 2071	Method Of High Voltage Testing
(2)	IEC – 60270	Partial Discharge Measurement
(3)	IEC – 60	High Voltage Test Techniques
(4)	IEC – 8263	Method of RIV test on high voltage insulators
(5)	IS – 16227 (Part I & II)	Current Transformers
(6)	IS – 16227 (Part I & III)	Voltage Transformers
(7)	IS – 11322	Method for partial discharge measurement in instrument transformers
(8)	IEC – 44 – Part 4	Partial Discharge Measurement
(9)	IS – 12063	Classification of degree of protection provided by enclosures of Electrical equipments.
(10)	IS – 3427	HT switchgear and controlgear



ANNEXURE - II

PRINCIPAL TECHNICAL PARAMETERS OF EQUIPEMNT

Sr. No.	ITEM	Specification				
A) SYS	TEM PARAMETERS					
1	Rated voltage	11 kV	22 kV	33 kV		
2	Highest System Voltage	12 kV	24 kV	36 kV		
3	Short circuit withstand current and duration (KA rms/sec)	11 kV	22 kV	33 kV		
	FOR 75/5 A, 100/5A	13.10 kA	26.20 kA	26.20 kA		
	FOR 50, 25/5A	6.70 kA	13.10 kA	13.10 kA		
	FOR 10/5A	3.00 kA	6.70 kA	6.70 kA		
	FOR 5/5A	3.00 kA	3.00 kA	3.00 kA		
4	Frequency	50 Hz	50 Hz	50 Hz		
B) CUI	RRENT TRANSFORMER					
1	Туре	Single Phase, cast resin				
2	Insulation class	'E'				
3	Rated voltage	11 kV	22 kV	33 kV		
4	Rated primary current (A)	5,10,25,50, 75,100,200,300,400				
5	Rated secondary current (A)		5			
6	Basic insulation level (KV)	12/28/75	24/50/125	36/70/170		
6.1	One minute power frequency Withstand voltage (KVrms)	28	50	70		
6.2	1.2/50 microsecond impulse voltage (KVP)	75	125	170		
7	Rated continuous thermal current	1.2 times the rated current				



8	Burden (VA)		10 VA		
9	Class of Accuracy	0.5S & 0.2 S as per requirement			
10	Instrument security factor		5 or less		
11	Core details		Single core		
12	Short circuit withstand current and duration (KA rms/sec)	11 kV	22 kV	33 kV	
	For 100/5A	13.10kA	26.20 kA	26.20 kA	
	For 50,25/5A	6.70 kA	13.10 kA	13.10 kA	
	For 10/5A	3.00 kA	6.70 kA	6.70 kA	
	For 5/5A	3.00 kA	3.00 kA	3.00 kA	
13	Rated dynamic withstand current (KAp)	2.5 Times STC			
14	1 Applicable standard	IS-16227 part I & II			
15	Dimensions of CT	11 kV	22 kV	33 kV	
	Height (mm)Max.	251	295	383	
	Distance between terminals (mm)	110	110	110	
	Mounting arrangement (mm)	285x140	340x170	360x170	
C) PO	FENTIAL TRANSFORMER				
1	Rated primary voltage (V)	11000/√3	22000/√3	33000 /√ 3	
2	Rated secondary voltage (V)	110/ √ 3			
3	Ratio Tap	Single Ratio			
4	Core details & purpose	Single core & commercial metering.			
5	Туре	Resin Cast			
6	Insulation class	Е			



7	Insulation level				
7.1	One minute power frequency Withstand voltage (KVrms)	28	50	70	
7.2	1.2/50 microsecond impulse voltage (KVP)	75	125	170	
8	Applicable standard	IS	– 16227 Part I &	III	
9	Ratio (V)	$\frac{11000/110}{\sqrt{3}}$	22000 / 110 / 3 / 3	<u>33000</u> / <u>110</u> √3 √3	
10	1 Rated burden		50 VA		
11	1 Class of accuracy	0.5 or	0.2 as per requi	rement	
	Dimensions of PT	11 kV	22 kV	33 kV	
12	Height (mm)	251	295	383	
	Mounting arrangement (mm)	280x190	205x310	405x230	
D) ME	TAL CABINET				
1	Overall dimensions		As per drawing		
2	Material		Mild Steel		
3	Plate Thickness				
3.1	Side plates (mm)		2 mm		
3.2	Bottom Plates (mm)	2 mm			
3.3	Top Plate (mm)	2 mm			
E) BUS	SBARS/ CONNECTING STRIPS				
1	Material E. C. Grade Copper				
2	Cross Section	Rectangular 25mm X 6mm			



SCHEDULE - "C"

TENDERER'S EXPERIENCE

Tenderer shall furnish here a list of similar orders executed / under execution by him to whom a reference may be made by purchaser in case he considers such a reference necessary.

Sr.N o.	Name descript ordered	of ion	cliei of	nt & items	Value order	of	Period of supply & commissioning	Name Address whom reference may be ma	& to ade
1		2			3		4	5	

Name of the Firm: _____

Name & signature of tenderer: _____

Designation: _____

Date: _____



DRAWINGS

The following drawings are enclosed herewith.

SR. NO. NAME OF DRAWING

- (1) INDOOR / OUTDOOR 11 KV METERING CUBICLE
- (2) INDOOR / OUTDOOR 22 KV METERING CUBICLE
- (3) SINGLE LINE DIAGRAM OF INDOOR / OUTDOOR HT METERING CUBICLE
- (4) BILL OF MATERIAL



SCHEDULE – "A"

GUARANTEED TECHNICAL PARTICULARS

ITEM: 11 KV / 22 KV INDOOR / OUTDOOR METERING CUBICLE						
SR. NO.	GUARANTEED TECHNICAL PARAMETERS	GTP VALUES				
(1)	[I] HIGH VOLTAGE METERING CUBICLE	TEXT				
	(A) MANUFACTURERS NAME					
(2)	(B) TYPE	TEXT				
(3)	(C) RATED VOLTAGE (KV)	TEXT				
(4)	(D)HIGHEST SYSTEM VOLTAGE (KV)	TEXT				
(5)	(E) POWER FREQUENCY WITHSTAND (ONE MINUTE VOLTAGE) KVRMS	TEXT				
(6)	(F) IMPULSE WITHSTAND (1.2/50 MICRO. SEC.) VOLTAGE (KVpeak)	TEXT				
(7)	(G) SHORT CIRCUIT WITHSTAND (ONE SECOND) (KArms)	TEXT				
(8)	(H) DYNAMIC WITHSTAND (KApeak)	TEXT				
(9)	(I) THICKNESS OF METAL SHEET	TEXT				
	(a) BOTTOM AND TOP (MM)					
(10)	(b) FRONT DOOR (MM)	TEXT				
(11)	(c) ALL SIDES (MM)	TEXT				
(12)	(J) WHETHER DEGREE OF PROTECTION PROVIDED AS PER IS: 12063.	TEXT				
(13)	(K) MATERIAL & THICKNESS OF GLAND PLATES	TEXT				
(14)	(L) MINIMUM CLEARANCE IN AIR INSIDE CABINET	TEXT				
	(a) BETWEEN PHASES IN(MM)					
(15)	(b) PHASE TO EARTH (MM)	TEXT				
(16)	(M) CUBICLE WEIGHT (KG)	TEXT				



(17)	(N) GROUNDING MATERIAL AND SIZE OF EARTH BUS.	TEXT
(18)	(O) WHETHER NINE INDEPENDENT EARTH POINTS ARE PROVIDED (YES/NO)	BOOLEAN
(19)	(P) WHETHER TOUGHTENED GLASS OVER GRILLED WINDOW OF SIZE 200X200X5 MM IS PROVIDED TO METER COMPARTMENT DOOR(YES/NO)	BOOLEAN
(20)	(Q)WHETHER METER COMPARTMENT IS PROVIDED WITH NON - RESETTABLE MECHANICAL IMPULSE COUNTER(YES/NO)	BOOLEAN
(21)	(R) WHETHER DETACHABLE TOP COVER IS PROVIDED WITH TWO INTERLOCK (YES/NO)	BOOLEAN
(22)	[II] BUSBARS / CONNECTING STRIPS (A) MATERIAL	TEXT
(23)	(B) STANDARD TO WHICH BUSBAR MATERIAL CONFORMS	TEXT
(24)	(C) TYPE OF INSULATION PROVIDED COVERED BY RESIN CAST BLOCKS	TEXT
(25)	(D) MINIMUM CLEARANCE (E) PHASE TO PHASE (mm)	TEXT
(26)	(F) PHASE TO EARTH (mm)	TEXT
(27)	(G) CONTINIOUS CURRENT RATING UNDER SITE CONDITIONS. (AMP)	TEXT
(28)	(H)TEMPERATURE RISE OVER AMBIENT TEMPERATURE FOR CURRENT RATING AS PER S.NO. '5' (DEGREE C)	TEXT
(29)	[III] CURRENT TRANSFORMES (A) TYPE	TEXT
(30)	(B) NO. OF CORES	TEXT
(31)	(C) MANUFACTURER'S TYPE DESIGNATION	TEXT
(32)	(D)CONFORMING TO STANDARD	TEXT



(33)	(E) CLASS OF ACCURACY.	TEXT
(34)	(F) RATED PRIMARY CURRENT (A)	TEXT
(35)	(G) RATED SECONDARY CURRENT (A)	TEXT
(36)	(H)RATED BURDEN (VA)	TEXT
(37)	(I) NO. OF PRIMARY TURNS	TEXT
(38)	(J) NO. OF SECONDARY TURNS	TEXT
(39)	(K) CROSS SECTIONAL AREA OF PRIMARY WINDING	TEXT
(40)	(L) CROSS SECTIONAL AREA OF SECONDARY WINDING	TEXT
(41)	(M) CURRENT DENSITY OF WINDING MATERIAL	TEXT
(42)	(N)INSTRUMENT SECURITY FACTOR (ISF)	TEXT
(43)	(O) INSULATION CLASS	TEXT
(44)	(P) BASIC INSULATION LEVEL (B-I-L)	TEXT
(45)	(Q)RATED SHORT TIME CURRENT WITHSTAND FOR 1 SEC. DURATION (KARMS).	TEXT
(46)	(R) RATED DYNAMIC WITHSTAND CURRENT (KApeak).	TEXT
(47)	(S) MAX. CURRENT RATIO ERROR AT RATED FREQUENCY WITH SEC. BURDEN BETWEEN 25% TO 100% OF RATED BURDEN.	TEXT
(48)	(T) MAX. PHASE DISPLACEMENT IN MINUTES AT RATED FREQUENCY WITH SEC. BURDEN BETWEEN 25% TO 100% OF RATED BURDEN.	TEXT
(49)	(U) RATED CONTINUOUS THERMAL CURRENT	TEXT
(50)	(V) HIGHEST SYSTEM VOLTAGE(KV)	TEXT
(51)	(W) ONE MINUTE POWER FREQUENCY WITHSTAND VOLTAGE (KVRMS)- DRY	TEXT
(52)	(X) 1.2/50 MICRO-SECOND IMPULSE WITHSTAND	TEXT



	VOLTAGE (KVP)	
(53)	(Y) ONE MINUTE POWER FREQUENCY WITHSTAND VOLTAGE OF SECONDARY WINDING (KVP)	TEXT
(54)	[IV] POTENTIAL TRANSFORMER	TEXT
	(A) TYPE	
(55)	(B) NO. OF CORES	TEXT
(56)	(C) APPLICABLE STANDARD	TEXT
(57)	(D) MANUFACTURER'S TYPE DESIGNATION	TEXT
(58)	(E) CLASS OF ACCURACY	BOOLEAN
(59)	(F) RATIO	TEXT
(60)	(G) RATED BURDEN (VA)	TEXT
(61)	(H)VOLTAGE FACTOR AND DURATION.	TEXT
(62)	(I) INSULATION CLASS	TEXT
(63)	(J) INSULATION LEVEL (B-I-L)	TEXT
(64)	(K) MAXIMUM RATIO ERROR WITH BURDEN BETWEEN 25 TO 100 % AND AT ANY VOLTAGE BETWEEN 80 TO120 % OF RATED VOLTAGE AT RATED P.F. (%)	TEXT
(65)	(L) MAXIMUM PHASE ANGLE ERROR WITH BURDEN BETWEEN 25 TO 100 % AND AT ANY VOLTAGE BETWEEN 80 TO 120 % OF RATED VOLTAGE AT RATED P.F. (MIN)	TEXT
(66)	(M) ONE MINUTE POWER FREQUENCY WITHSTAND TEST (DRY) VOLTAGE (KVrms)	TEXT
(67)	(N)1.2/50 MICRO - SECOND IMPULSE WAVE WITHSTAND TEST VOLTAGE (KVpeak)	TEXT
(68)	[V] OTHER REQUIREMENT (A) WHETHER ALL TYPE TESTS SHALL BE CARRIED OUT AT NABL LABORATORY	BOOLEAN



(69)	(B) TYPE TEST REPORT NOS. & DATE	TEXT
(70)	(C) WETHER TYPE TEST REPORTS SUBMITTED ALONGWITH OFFER	BOOLEAN
(71)	(D) WHETHER MINIMUM TESTING FACILITY AS PER CLAUSE NO. 12.00 ARE AVAILABLE	BOOLEAN
(72)	(E) WHETHER MINIMUM MANUFACTURING FACILITIES ARE AVAILABLE IN MANUFACURER'S PREMISES	BOOLEAN
(73)	(F) GUARANTEE OF PRODUCT (YEARS)	NUMERIC
(74)	(G) WHETHER SUPPLIER AGREES TO SUPPLY RECOMMENDED SPARES LIKE SINGLE CORE RESIN CAST CTS & PTS OF SPECIFIC RATINGS AS AND WHEN REQUIRED BY MSEDCL AFTER GUARANTEE PERIOD.	BOOLEAN
(75)	(H)WHETHER DETAILS OF AFTER SALES SERVICE WITHIN GUARANTEE PERIOD ENCLOSED WITH OFFER	BOOLEAN
(76)	(I) WHETHER DETAILS OF AFTER SALES SERVICE TO BE PROVIDED OUTSIDE GUARANTEE PERIOD ENCLOSED WITH OFFER	BOOLEAN

























