MATERIAL SPECIFICATIONS CELL

TECHNICAL SPECIFICATION

OF

LT 300/5 AMPS OR 400/5 AMPS OR 600/5 AMPS OR 800/5 AMPS CT OPERATED METERING CABINET COMPRISING OF CTs, MCCBs WITH ENERGY METER

INDEX

1.00 SCOPE:

This Specification covers design, manufacture, testing at works, supply and delivery of SMC cabinet (Sheet Moulding Compound-FRP material) comprising of 300 / 5 Amps or 400 / 5 Amps or 600 / 5 Amps or 800 / 5 Amps resin cast CTs and LT AC, Three Phase, Four Wire, 400 / 5 Amps or 600 / 5 Amps or 800 / 5 Amps CT operated fully Static AMR compatible TOD Tri-Vector Energy Meter as per Category C1 of IS: 15959 / 2011 (amended upto date) for measurement of different electrical parameters listed elsewhere in this document including Active Energy (kWh), Reactive Energy (kVArh) Lag and (kVArh) Lead separately, Apparent Energy (kVAh) etc. in three phase, four wire balanced / unbalanced loads of LT Consumers. The system shall be AC, three phase, four wire, 415 Volts, 50 Hz with effectively grounded neutral.

The equipment shall conform in all respects to high standards of engineering, design and workmanship and shall be capable of performing in continuous commercial operation, in a manner acceptable to purchaser, who will interpret the meaning 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 offered material 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 Bidder's supply irrespective of whether those are specifically brought out in these specifications and / or the commercial order or not.

2.00 APPLICATION:

For use on LT consumer installations having load above 200 Amps and upto 300 Amps/400 Amps/600 Amps/800 Amps.

3.00 SERVICE CONDITIONS:

The equipments to be supplied against this specification shall be suitable for satisfactory continuous operation under the following tropical conditions.

Environmental Conditions

a)	Maximum ambient temperature	55^0C
b)	Maximum ambient temperature in shade	45^0C
c)	Minimum temperature of air in shade	35^0C
d)	Maximum daily average temperature	40^0C
e)	Maximum yearly weighted average temperature	32^0C
f)	Relative Humidity	10 to 95 %
g)	Maximum Annual rainfall	1450 mm
h)	Maximum wind pressure	150 kg/m2

i) Maximum altitude above mean sea level 1000 meters

j) Isoceraunic level 50 days/year

k) Seismic level (Horizontal acceleration) 0.3 g

l) Climate: Moderately hot and humid tropical climate conducive to rust and fungus growth.

As per IS: 14697 / 1999 (amended up to date), the meter to perform satisfactorily under Non-Air Conditioned environment (within stipulations of IS). Meter body shall conform to IP51 degree of protection.

The meter shall be suitably designed for satisfactory operation under the hot and hazardous tropical climate conditions and shall be dust and vermin proof. All the parts and surface, which are subject to corrosion, shall either be made of such material or shall be provided with such protective finish, which provided suitable protection to them from any injurious effect of excessive humidity.

4.00 GENERAL TECHNICAL PARTICULARS:

These cabinets are to be supplied as complete units consisting of LT AC, three Phase, four Wire, 300 / 5 Amps or 400 / 5 Amps or 600 / 5 Amps or 800 / 5 Amps CT operated fully Static AMR compatible TOD Tri-Vector Energy Meters with Optical & RS 232 Port as per Category C1 of IS: 15959 / 2011 along with Resin cast CTs with and MCCBs in SMC material of S3 grade moulded cabinet duly wired as shown in the general arrangement drawings. The supply shall be as per final approved drawings.

Tenderer shall submit Type Test Reports for offered Meter, Resin cast CTs with plug-in type arrangement, MCCB & CT operated metering unit of each rating, along with offer, failing which the offer shall be rejected.

5.00 TECHNICAL SPECIFICATIONS FOR ENCLOSURE (METERING CABINET):

5.01 There shall be three compartments. The Meter & CT shall be housed in one compartment, MCCB in second compartment and outgoing terminal in third compartment. Separate partition to isolate the three compartments from each other shall be provided.

5.02 The compartments shall be made by using SMC (FRP material) of 2.5 mm thick. Additional M.S. angle of minimum 20 x 20 x 2 mm or formed channel of 2 mm sheet steel for supporting the doors shall be provided.

5.03 The enclosure shall be moulded out of SMC (FRP material) of S3 grade confirming to IS: 13410 of not less than 2.5 mm thickness.

5.04 The enclosure shall comply with the requirement of IP 55 type as per IS 13947 or the latest version thereof with Meter, CTs, MCCB and other

accessories enclosed.

5.05 Suitable vents fitted with G. I. Double wire mesh shall be provided from inside to ensure that the temperature inside the enclosure is not substantially different from that of the atmosphere.

5.06 Fixing of MCCB inside the enclosure shall be such as to allow free circulation of air at its back and sides.

5.07 Doors of the each chamber shall be provided with panel lock \ locks. Two master keys for opening the doors shall be provided. In addition to the panel lock, arrangement for providing pad locks shall be made. The hinges for compartment covers shall be as shown in the drawing and shall be so designed that the door cannot be opened without breaking the seals, i.e. the hinges shall be provided from inside.

5.08 Necessary fixing arrangement shall be provided at the back of the enclosure. The thickness of the fixing plate shall be minimum 5 mm.

5.09 Durable neoprene rubber gasket shall be provided around the enclosure to ensure dust and vermin proof door construction. Rubber lining shall be at least 3 mm thick.

5.10 Roof shall be slopping down backwards with 5 degree angle.

5.11 The knock out holes shall be provided on the bottom. Suitable size of brass Cable glands shall be provided for these holes. The size of cable shall be aluminium XLPE armoured cable as per suitable current rating of CT.

5.12 Sealing arrangement shall be provided for Meter, CT, MCCB & outgoing terminal chamber separately.

5.13 Inter connecting cable for connection from CT to MCCB & from MCCB to outgoing terminal block shall be single core multi-stranded copper cable of size 185 sq.mm for 300/400 Amps, 400 sq.mm for 600 Amps & 630 sq.mm for 800 Amps.

5.14 The Danger Board as per MSEDCL drawing and confirming to IS: 2551 / 1982 shall be fitted on the cabinets.

5.15 The lugs suitable for single core multi stranded copper cables of size 300 sq. mm shall be used for making connections inside the cabinet. All lugs shall be made out of tinned copper.

5.16 All holes for internal connections through which cables \ leads are supposed to pass shall be provided with rubber grommet.

5.17 Suitable Stainless Steel handles on both doors shall be provided to all the doors separately to open and close.

5.18 For SMC cabinet, the MCCB & CTs shall be mounted on SMC sheet of 6 mm thick or an angle frame and then it shall be fitted in enclosure. The meter shall be mounted on the arrangement as shown in the drawing.

5.19 The dimensions of the outgoing terminal block of Bakelite shall be minimum 300 x 50 x 15 mm for 800 Amps cabinets. The tinned copper strip of 25 x 8 mm and 180 mm long size shall be provided for outgoing termination of cables. Incoming terminal of CT having 80 mm minimum length shall be bolted directly on the terminal block. Fully threaded Stainless Steel bolts with 2 nuts and washers of size shown in the drawing shall be provided for connections.

5.20 MCCB shall be so mounted that its operating knob / lever can be operated from outside without opening the door. It shall also be possible to lock the MCCB in "OFF" position so that it cannot be switched "ON".

5.21 Toughened glass of 200 x 150 x 2 mm size for observing meter reading shall be provided from inside the door. It shall be so fitted that in the event of breaking, it shall be possible to replace it after opening the door.

5.22 All the wiring inside the cabinet is included in the scope of work. The internal copper cables shall be suitably clamped inside the cabinet.

5.23 CTs shall be fixed with proper clamps using stainless steel bolts. All nuts & bolts used in the cabinet for current carrying path shall be of Stainless Steel only.

5.24 The Colour of the SMC Meter box shall be Siemens Grey.

5.25 The SMC meter box shall be made of anti-corrosive, dust proof, rust proof, vermin and water proof, ultra violet stabilized and flame retardant high grade SMC material having good dielectric and mechanical strength property

5.26 SAFETY ARRANGEMENTS:

5.26.01 Two galvanized M.S. earthing bolts of M10X35 size shall be provided for external earth connections. These shall be complete with plain washers, spring washers, nuts, etc. Earthing Bolts must be fitted properly to prevent removal of the same from the box.

5.26.02 All live connections shall be insulted with durable insulation material

5.27 TESTING AND MANUFACTURING FACILITIES

5.27.01 TESTING FACILITIES:

The Tenderer must clearly indicate the details of testing facilities available in the works of manufacturer and whether the facilities are adequate to carry out all the Routine and Acceptance tests. These facilities shall be available to MSEDCL Engineers, if deputed to carry out or witness the tests in the manufacturer's works. The tenderer must have all in-house testing facility to carry out acceptance & routine tests on the Cabinet. If any test cannot be carried out in the manufacturer works, the same shall be clearly stated. All testing equipments shall be duly calibrated in the NABL approved laboratories.

In case of SMC enclosure, the tenderer shall have in house testing

facilities to carry out all the Routine and Acceptance tests as per IS 13410 / 1992

5.27.02 The tenderer shall have following minimum manufacturing facilities in-house to prove his reliability as a manufacturer of CT Operated Energy Metering Cabinet.

For SMC enclosure, the tenderer shall have the following minimum manufacturing facilities in house to prove his reliability as a manufacturer of CT Operated Energy Metering Cabinet.

(a) SMC material manufacturing machine

(b) Hydraulic press for hot press compression moulding

(c) Assembly lines for fabrication and fitting

(d) Assembling tools

The tenderer shall furnish detailed process of painting. In case the painting is to be carried out from outside agency, the tenderer shall furnish the facilities available with sub-contractor.

6.00 TESTS & TEST CERTIFICATES

6.01 The LT CT Operated Metering Cabinet consisting of Meter, MCCB, CTs, etc. as per the specifications shall be fully type tested in accordance with the relevant standards and as per the MSEDCL requirement at NABL accredited lab. The tenderer shall furnish detailed type test reports of the tests carried out within 5 years prior to due date of opening of offer.

All the type test reports shall be submitted and got approved from the Chief Engineer, Testing & Quality Control Cell, MSEDCL, 5th Floor, Prakashgad, Bandra (E), Mumbai – 400 051 as per the tender conditions.

The purchaser reserves the right to demand repetition of some or all the type tests in presence of purchaser's representative at purchaser's cost.

All the Type Tests specified in the technical specifications 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 ERDA, ERTL, CPRI, etc. to prove that equipments meet the requirement of the specification. The tenderer shall also furnish certificate from laboratories where type tested that required test facility available in house for that particular test. Type Test Reports conducted in manufacturers own laboratory and certified by testing institute shall not be acceptable

6.02 The type test reports for CT Operated Metering Cabinet as given below shall be furnished with certified drawings to prove that equipment offered meets the following requirement of the specification.

Sr. No.	Test	Reference Standard	Required Value
1	Marking	IS 14772:2000, Cl. 7	Manufacturer Name & Danger Logo Screen Printing
2	Dimensions	IS 14772:2000, Cl. 8	As per specification and drawing
3	Protection against Electric Shock	IS 14772:2000, Cl. 9	As per IS
4	Provision for Earthing	IS 14772:2000, Cl. 10	As per IS
5	Construction	IS 14772:2000, Cl. 11	No Crack or Damage
6	Resistance to Ageing, to humid condition, to ingress of solid objects and to harmful ingress of water	IS 14772:2000, Cl. 12	No Crack or Damage
7	Mechanical Strength	IS 14772:2000, Cl. 13	No Crack or Damage
8	Resistance to Heat	IS 14772:2000, Cl. 14	No ball impression
9	Resistance to Insulating Material to Abnormal Heat and Fire	IS 14772:2000, Cl. 15	No Flame and Glowing
10	Resistance to Rusting	IS 14772:2000, Clause No. 16	No sign of rust observed
11	Resistance to Tracking	IS 14772:2000, Clause No. 17	No failure or breakdown occurs before 50 Drops 175V
12	Heat Deflection Temperature @ 1.8 Mpa (On Enclosure)	IS 13411:1992	> 150
13	Exposure to Flame	IS 4249:1967	Self Extinguishing
14	Flammability	UL-94/IS-11731	V0
15	Melting Point	IS:13360 (Part-6/Sec-10):1992	Does not melt upto 400 deg C
16	Degree of Protection (IP-55)	IS:13947:1993 (Part-1)	IP-55
17	Glow wire test at 960 Deg C	IS:11000	No flame and glowing observed
18	Ball Pressure Test	IEC-335	No Ball Impression Observed
19	UV Ageing Test for 200 Hours	ASTM-G-53	No Colour Change, no chalking and No discoloration observed
20	Water Absorption	IS:13411-1992	< 0.25%
21	Material Identification	As per Laboratory Method	Glass reinforced polyester Sheet Moulding compound (SMC)

22	Glass content, percent by mass (Min.)	IS:13410-1992	20
23	Izod impact strength (Notched), KJ/m2	IS:13410-1992	55
24	Flexural Strength ,MPa , Min	IS:13410-1992	170
25	Power Arc Resistance Sec. Min.	IS:13410-1992	180
26	Modulus of Elasticity, 103 , MPa	IS:13410-1992	12 to 15
27	Tracking Resistance CTI, Min	IS:13410-1992	1000
28	Dielectric Strength at 90oC in Oil KV/mm	IS:13410-1992	11
29	Dissipation factor (4 days at 80 % RH & 1 KHz)	IS:13410-1992	0.01
30	Heat Distortion Temperature, oC ,Min	IS:13410-1992	150
31	Oxygen Index,% Min	IS:13410-1992	24
32	Temperature rise test on complete unit at rated current of unit	IS: 8623 / 1993 amended upto date	-

6.03 Acceptance Tests:

Following tests shall be carried out as acceptance tests in addition to Routine Tests.

On Complete Unit

Temperature Rise Test on one sample of each rating. Temperature rise test will be carried out as per the procedure given below:

For temperature rise test, a metering cabinet with all assembly of MCCBs, CT, and meter shall be kept in an enclosure such that the temperature outside the box shall be maintained at 50^0 C.

Time current characteristic for MCCB at 1.05 & 1.2 times overload release setting current.

On CT as per relevant IS: 16227

On MCCB as per relevant IS: 13947 / 1993.

Tests as per IS: 8623 / 1993 on the Enclosure.

Tests as per IS: 13410 for SMC Enclosure

6.04 Routine tests:

(a) On Complete Unit

(i) Overall Dimension checking.

(ii) Insulation Resistance Tests.

(iii) High Voltage Test.

(b) Operation Test on MCCB.

(c) On CT as per relevant IS: 16227.

(d) On MCCB as per relevant IS: 13947 / 1993.

(e) Tests as per IS: 13410 / 1992 for SMC Enclosure

For MCCB, CT & Meter, required tests shall be carried out at Original Equipment Manufacturer's work

7.00 TECHNICAL SPECIFICATIONS OF LT AC THREE PHASE FOUR WIRE CT OPERATED FULLY STATIC AMR COMPATIBLE TOD TRI- VECTOR ENERGY METER AS PER CATEGORY "C1" OF IS 15959/2011 (AMENDED UPTO DATE)

7.01 SCOPE:

This specification covers design, manufacturing, testing, supply and delivery of ISI marked LT AC, three Phase, four Wire, 300 / 5 Amps or 400 / 5 Amps or 600 / 5 Amps or 800 / 5 Amps CT operated fully Static and AMR compatible TOD Tri - Vector Energy Meters with Optical & RS 232 Port as per Category C1 of IS: 15959 / for measurement of different electrical parameters listed elsewhere in the document including Active Energy (kWh), Reactive Energy (kVArh) Lag and (kVArh) Lead separately, Apparent Energy (kVAh) etc. in three phase, four wire balanced / unbalanced loads of LT Consumers.

7.02 GENERAL TECHNICAL REQUIREMENT:

1	TYPE	LT AC, Three Phase, Four Wire, 300 / 5 Amps or 400 / 5 Amps or 600 / 5 Amps or 800 / 5 Amps CT operated fully Static & AMR compatible TOD Tri - Vector energy Meters with Optical & RS 232 Port as per Category C1 of IS: 15959 / 2011 for use on LT Consumers installation..
2	FREQUENCY	50 Hz ± 5%
3	ACCURACY CLASS	0.5S (FOR ACTIVE AND REACTIVE ENERGY)
4	RATED VOLTAGE	415 V Ph-Ph or 240 V Ph-N
5	VOLTAGE RANGE.	+15% to – 30% of rated voltage.
6	CURRENT RATING	300 / 5 Amps or 400 / 5 Amps or 600 / 5 Amps or 800 / 5 Amps

7	BASIC CURRENT Ib	5 Amps
8	MAXIMUM CONTINUOUS CURRENT (Imax)	2 times (200 %) Ib
9	SHORT TIME OVER CURRENT	As per IS: 14697 / 1999
10	STARTING CURRENT	0.1% of Ib
11	POWER CONSUMPTION	The active and apparent power consumption, in each voltage circuit, at reference voltage, reference temperature and reference frequency shall not exceed 1.0 W and 4 VA. The apparent power taken by each current circuit, at basic current Ib, reference frequency and reference temperature shall not exceed 2 VA.
12	POWER FACTOR	Power Factor range: Zero Lag to unity to Zero Lead Avg. P.F = $\frac{\text{Total(kWh)}}{\text{Total (kVAh)}}$ $kVAh=\sqrt{(kWh)^2+(RkVAhlag+RkVAhlead)^2}$
13	DESIGN	Meter shall be designed with application specific integrated circuit (ASIC) or micro controller; shall have no moving part; electronic components shall be assembled on printed circuit board using surface mounting technology; factory calibration using high accuracy (0.1 class) software based test bench.
14	POWER SUPPLY	Switched-Mode Power Supply (SMPS)
15	TEMPERATURE.	The standard reference temperature for performance shall be 27^0 C. The mean temperature co - efficient shall not exceed 0.03%.
16	ISI MARK	The meters shall bear ISI Mark.

7.03 MANUFACTURING FACILITIES

7.03.01 Manufacturer shall posses fully automatic computerized Meter Test Bench System having inbuilt source and load adjustment for carrying out routine and acceptance Tests as per IS: 14697 / 1999 (amended up to

date). In addition this facility shall be able to produce Test Reports for each and every Meter. The bidder shall have fully automatic Test Bench having in-built constant voltage, current and frequency source with facility to select various loads automatically and print the errors directly The tenderer shall have the necessary minimum testing facilities for carrying out the following tests.

Sr. No.	Name of Test
(1)	A.C. Voltage test
(2)	Insulation Resistance Test
(3)	Test of Accuracy Requirement
(4)	Test on limits of errors
(5)	Test on meter constant
(6)	Test of starting condition
(7)	Test of no-load condition
(8)	Repeatability of error test
(9)	Test of power Consumption
(10)	Vibration test
(11)	Shock Test
(12)	Transportation Test
(13)	Tamper conditions - as per MSEDCL, specification
(14)	Glow Wire Test
(15)	Long duration test
(16)	Flammability Test
(17)	The manufacturer shall have duly calibrated RSS meter of class 0.05 accuracy

7.03.02 METER SOFTWARE:

The bidder shall have to get appraised & obtain Capability Maturity Model Integration (CMMI)– Level III within one year from date of letter of award.

7.04 STANDARDS TO WHICH METERS SHALL COMPLY:

IS: 15959 / 2011 - Data Exchange for Electricity Meter Reading, Tariff and Load Control – companion specification for Category – “C1” Meters

(amended upto date);

IS: 14697 / 1999 (amended up to date) for AC Static Transformer operated Watt-hour and VAR-hour Meters, Class 0.5 S – Specification.

CBIP Tech-Report - 325 amended up to date for AC Static Transformer operated Watt Hour & VAR-Hour Meters (class 0.5S);

IS: 15707 / 2006 Specification for Testing, evaluation, installation & maintenance of AC Electricity Meters-Code of Practice;

CEA regulations and MERC guidelines with latest amendments.

The specification given in this document supersedes the relevant clauses of IS: 14697 / 1999 (amended up to date) wherever applicable.

The equipment meeting with the requirements of other authoritative standards, which ensures equal or better quality than the standard mentioned above, also shall be considered.

In case the bidder wishes to offer material conforming to the other authoritative 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 related with communication protocol, the Indian standard IS: 15959 / 2011 Data Exchange for Electricity Meter Reading, Tariff and Load Control – Companion Specification shall prevail upon.

For conflict related with other parts of the specification, the order of priority shall be – (i) this technical specification, (ii) IS: 14697 / 1999 amended upto date & CBIP Tech-Report - 325. (iii) IEC, (iv) other authoritative standards.

In case of any difference between provisions of these standards, the provisions of this specification shall prevail.

7.05 CONSTRUCTIONAL REQUIREMENT

7.05.01 GENERAL MECHANICAL REQUIREMENT

The meter shall be designed and constructed in such a way as to avoid introducing any danger in normal use and under normal conditions, so as to ensure especially.

(a) personal safety against electric shock:

(b) personal safety against effects of excessive temperature;

(c) safety against spread of fire;

(d) protection against penetration of solid objects, dust and water.

(e) Detection of fraud / pilferage

7.05.02 The meter shall be projection type and shall be dust and moisture proof. All parts that are likely to develop corrosion under normal working condition shall be effectively protected against corrosion by suitable method to achieve durable results.

7.05.03 All insulating materials used in the construction of the meter shall be substantially non-hygroscopic, non ageing and of tested quality.

7.05.04 METER CASE

7.05.04.01 The meter base & cover shall be made out of unbreakable, high grade, fire resistant polycarbonate material so as to give it tough and non-breakable qualities. Meter base shall be opaque and meter top cover shall be transparent.

7.05.04.02 The polycarbonate body of the meter shall conform to IS: 11731 / 1986 (FV-2 Category) besides meeting the test requirement of heat deflection test as per ISO 75, glow wire test as per the IS: 11000 (part 2/SEC-1) 2008 or IEC-60695-2-12, Ball pressure test as per IEC-60695-10-2 and Flammability Test as per UL 94 or as per IS: 11731 (Part-2) 1986. The type test certificate shall be submitted along with the offer.

7.05.04.03 The polycarbonate base and cover of meter shall be ultra-sonically welded (continuous welding) so that once the meter is manufactured and tested at factory; it shall not be possible to open the cover at site except the terminal cover. The thickness of material for meter cover and base shall be 2 mm (minimum).

7.05.04.04 The meter body shall be type tested for IP51 degree of protection as per IS: 12063 against ingress of dust, moisture & vermin. The type test certificate shall be submitted along with the offer.

7.05.04.05 The meter cover shall be secured to base by means of sealable unidirectional captive screws with two holes.

7.05.05 TERMINALS & TERMINAL BLOCK

7.05.05.01 The terminal block shall be made from high quality non-hygroscopic, fire retardant, reinforced polycarbonate / non-Bakelite material which shall form an extension of the meter case.

7.05.05.02 The material of which the terminal block is made shall be capable of passing the tests given in IS: 1336O (Part 6/Sec 17), ISO 75-1 (1993) & ISO 75-2 (1993) for a temperature of 135^0C and a pressure of 1.8 MPa (Method A). The type test certificate shall be submitted along with the offer

7.05.05.03 The holes in the insulating material which form an extension of the terminal holes shall be of sufficient size to also accommodate the insulation of the conductors.

7.05.05.04 The manner of fixing the conductors to the terminals shall ensure adequate and durable contact such that there is no risk of loosening or

undue heating.

7.05.05.05 Screw connections transmitting contact force and screw fixings which may be loosened and tightened several times during the life of meter shall screw into metal nuts.

7.05.05.06 All parts of every terminal shall be such that the risk of corrosion resulting from contact with any other metal part is minimized.

7.05.05.07 Electrical connections shall be so designed that contact pressure is not transmitted through insulating material of the terminal block.

7.05.05.08 The terminals, the conductor fixing screws or the external or internal conductors shall not be liable to come into contact with terminal covers.

7.05.05.09 Two screws shall be provided in each current & potential terminal for effectively clamping the external leads or thimbles.

7.05.05.10 Each clamping screw shall engage a minimum of three threads in the terminal. The ends of screws shall be such as not to pierce and cut the conductors used.

7.05.05.11 The minimum internal diameter of terminal hole shall be as per IS: 14697 / 1999 or CBIP Tech Report 325.

7.05.05.12 The manufacturer shall ensure that the supporting webs between two terminals of the terminal block shall be sufficiently high to ensure that two neighboring terminals do not get bridged by dust and there shall not be any possibility of flash over between adjacent terminals of the terminal block

7.05.06 TERMINAL COVER

7.05.06.01 The termination arrangement shall be provided with an extended transparent terminal cover as per clause number 6.5.2 of IS: 14697 / 1999 (amended upto date) irrespective of rear connections.

7.05.06.02 The terminal cover shall be made out of same material as that of meter body. The terminal cover shall be unbreakable, high grade, fire resistant Polycarbonate material so as to give it tough and non-breakable qualities. The terminal cover shall be transparent.

7.05.06.03 The terminal cover shall be provided with one side hinge

7.05.06.04 The terminal cover shall enclose the actual terminals, the conductor fixing screws and unless otherwise specified, a suitable length of external conductors and their insulation.

7.05.06.05 Independent sealing provision shall be made against opening of the terminal cover and front cover to prevent unauthorized tampering. It is necessary to provide unidirectional screws with two holes for sealing purpose of terminal cover. The meter shall be pilfer-proof & tamper-proof.

7.05.06.06 The fixing screws used on the terminal cover for fixing and sealing in terminal cover shall be held captive in the terminal cover.

7.05.06.07 Proper size of grooves shall be provided at bottom of this terminal cover for incoming service connections.

7.05.06.08 When the meter is mounted, no access to the terminals by any means shall be possible without breaking seals(s) of the terminal cover.

7.05.07 RESISTANCE TO HEAT AND FIRE

The terminal block, the terminal cover and the meter case shall ensure reasonable safety against the spread of fire. They shall not be ignited by thermal overload of live parts in contact with them

7.05.08 The meter shall be completely factory sealed except the terminal block cover

7.05.09 The provision shall be made on the meter for at least two seals to be put by utility user

7.05.10 A sticker label containing warning notice in Marathi language which is to be stick up on meters front cover or printed on meter name plate with easily readable font size not less than 10 in red colour, which reads as

"सावधान ! मीटरला फेरफार करण्याचा प्रयत्न केल्यास अधिकतम वेगाने वीज नोंदणी होणार मीटर

मध्ये फेरफार करणे, सीलतोडणे हा भारतीय वीज अधधधनयम २००३ नुसार कलम १३५/१३८ नुसार

दंडनीय अपराध आहे याची नोंद घ्यावी"

7.05.11 A Push button facility shall be provided for high resolution reading / alternate mode of display, as brought out elsewhere in this specification. Facility of scrolling of all the reading up and down in all display mode shall be provided.

7.05.12 OUTPUT

The meter shall have test output, accessible from the front, and be capable of being monitored with suitable testing equipment while in operation at site. The operation indicator must be visible from front. The test output device shall be provided in the form of blinking LED. Resolution of the test output device shall be sufficient to enable the starting current test in less than 10 minutes. The pulse rate of output device which is Pulse / kWh and Pulse / kVArh (meter constant) shall be indelibly provided on the nameplate.

7.06 The meter accuracy shall not be affected by external AC / DC / permanent magnetic field as per CBIP Technical Report 325 with latest amendments. If the meter gets affected under influence of any magnetic field (AC / DC / Permanent), then the same shall be recorded as magnetic tamper event with date & time stamping and the meter shall record energy maximum value current (Imax) and reference voltage at unity power factor.

7.06.10 The meter shall also be capable to withstand and shall not get damaged if phase to phase voltage is applied between phases & neutral for five minutes.

7.06.11 In meter, power supply unit shall be micro control type instead of providing conventional transformer and then conversion to avoid magnetic influence.

7.06.12 Non specified display parameter in the meter shall be blocked and it shall

not be accessible for reprogramming at site.

7.06.13 Complete metering system shall not be affected by the external electromagnetic interference such as electrical discharge of cables and capacitors, harmonics, electrostatic discharges, external magnetic fields and DC current in AC supply etc.

7.06.14 CTs are to be provided with magnetic shielding and they shall be tested separately prior to assembly.

7.06.15 PCB used in meter shall be made by Surface Mounting Technology.

7.06.16 REAL TIME INTERNAL CLOCK (RTC):

The real time clock shall be used in the meter for maintaining time (IST) and calendar. The RTC shall be non - rechargeable and shall be pre-programmed for 30 Years Day / date without any necessity for correction. The maximum drift shall not exceed +/- 300 Seconds per year. Facility for adjustment of real time shall be provided through CMRI with proper security.

The clock day/date setting and synchronization shall only be possible through password/Key code command from one of the following:

a) Hand Held Terminal (HHT) or Meter testing work bench and this shall need password enabling for meter;

b) From remote server through suitable communication network or Sub-station data logger "PC".

The RTC battery & the battery for display in case of power failure shall be separate.

Event log for changes in RTC shall be available with Date & Time.

7.06.17 The meter shall withstand any type of High Voltage and High Frequency surges which are similar to the surges produced by induction coil type instruments without affecting the accuracy of the meter. The accuracy of the meter shall not be affected with the application of abnormal voltage / frequency generating device such as spark discharge of approximately 35 KV. The meter shall be tested by feeding the output of this device to meter in any of the following manner for 10 minutes:

(i) On any of the phases or neutral terminals

(ii) On any connecting wires of the meter (Voltage discharge with 0-10 mm spark gap)

(iii) At any place in load circuit.

The accuracy of meter shall be checked before and after the application of above device.

7.06.18 SELF DIAGNOSTIC FEATURES:

(i) The meter shall keep log in its memory for unsatisfactory functioning or nonfunctioning of Real Time Clock battery, also it shall be recorded

and indicated in reading file at base computer software computer or to remote reading system.

(ii) All display segments: "LCD Test" display shall be provided for this purpose.

7.06.19 METER PROTOCOL:

The meter protocol shall be as per Annex E - Category C1 meters of IS: 15959 / 2011 amended upto date.

7.06.20 The watch dog provided shall invariably protect the hanging of microprocessor during such type of tampering devices

7.06.21 COMMUNICATION CAPABILITY:

The meter shall be provided with two ports for communication of the measured / collected data as per IS: 15959 / 2011, i.e. a hardware port compatible with RS-232 specifications, RJ - 11 type, which shall be used for remote access through suitable Pluggable Modem (4G/2G/3G/NB-IoT/PLCC/LPRF) and an Optical port complying with hardware specifications detailed in IEC – 62056 - 21. This shall be used for local data downloading through a DLMS compliant HHT. RS-232 port or TCP / IP port as required on terminal block is also acceptable.

Sealing arrangement for Optical & RS 232 port or TCP / IP port as required shall be provided.

During data communication process through either AMR or MRI, the meter energy recording should not get affected.

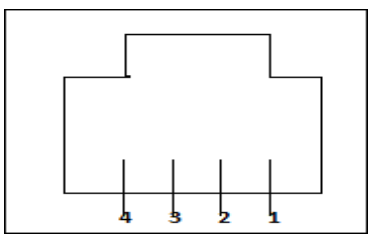
Both ports shall support the default and minimum baud rate of 9600 bps.

Necessary chord for Optical Port of minimum length of 1 metre in the ratio 25:1 shall be provided free of cost.

The minimum requirements for RS-232 based systems are described below:

i. The interface shall meet all the requirements of RS-232 specifications in terms of Physical media, Network topologies, maximum devices, maximum distance, mode of operation, etc.

ii. RJ 11 type connectors have to be provided to easily terminate the twisted pair



PIN DESCRIPTION

Pin No	Signal
1	RTS (Ready To Send)
2	Ground (GND)
3	Transmit Data (Tx)
4	Receive Data (Rx)

7.06.22 The meter shall have facility to read the default display parameters during Power supply failure. For this purpose an internal battery may be provided.

7.06.23 The internal battery shall be Ni-mh or Li-ion or NI CD maintenance free battery of long life of 10 years. A suitable Push Button arrangement for activation of this battery shall be provided. Alternatively, push button provided for displaying alternate mode (On Demand Mode) parameters shall also be acceptable for activation of battery during power OFF condition.

7.06.24 Wire / Cable less design: The meter PCB shall be wirel ess to avoid improper and loose connections/ contacts.

7.06.25 The Meter shall record and display total energy including Harmonic energy.

7.06.26 The data stored in the meters shall not be lost in the event of power failure. The meter shall have Non Volatile Memory (NVM), which does not need any battery backup. The NVM shall have a minimum retention period of 10 years.

7.06.27 Reverse reading lock of main kWh and kVAh reading is to be incorporated with necessary software modification if required additionally.

7.06 DEMAND INTEGRETION PERIOD:

The maximum demand integration period shall be set be 30 minutes by block window method.

7.07 MD RESET:

The meter shall have following MD resetting options.

i) Communication driven reset;

ii) Manual resetting arrangement with sealing facility;

iii) Automatic reset on First day of every month at 00.00 Hrs - This option shall be blocked by default and made programmable through hand held terminal / CMRI for the actual date required.

7.08 TOD TIMING:

There shall be provision for at least 6 (Six) TOD time zones for energy and demand. The number and timings of these TOD time Zones shall be programmable. At present the time zones shall be programmed as below.

Zone "A": - 00=00 Hrs. to 06=00 Hrs. and 22=00 Hrs. to 24=00 Hrs

Zone "B": - 06=00 Hrs. to 09=00 Hrs. and 12=00 Hrs. to 18=00 Hrs

Zone "C": - 09=00 Hrs. to 12=00 Hrs.

Zone "D": - 18=00 Hrs. to 22=00 Hrs.

7.09 TAMPER AND FRAUD MONITORING FEATURES

7.09.01 ANTI TAMPER FEATURES

The meter shall detect and correctly register energy only in forward direction under following tamper conditions:

(i) Change of phase sequence: The meter accuracy shall not be affected by change of phase sequence. It shall maintain the desired accuracy in case of reversal of phase sequence.

(ii) Reversal of line and load terminals: Even on interchanging the load and line wires, the meter shall register correct energy passing through the meter. The meter shall also display the energy recorded in reverse mode separately.

(iii) Drawing of current through local Earth: the meter shall register accurate energy even if load is drawn partially or fully through a local earth.

(iv) The three phase meter shall continue to work even without neutral.

(v) The three phase meter shall work in absence of any two phases, i.e. it shall work on any one phase wire and neutral, to record relevant energy.

(vi) The meter shall work without earth.

(vii) The potential link shall not be provided.

(viii) Visual indication shall be provided to safeguard against wrong connections to the meter terminals.

(ix) The meter shall be immune to the external magnetic field (AC / DC / Permanent) upto 0.2 Tesla. If the accuracy of the meter gets affected under the influence of magnetic field more than 0.2 Tesla, then the same shall be recorded as magnetic tamper event with date & time stamping and the meter shall record Energy considering the maximum value current (Imax) at ref. voltage and unity PF in all the three phases.

(x) If a consumer tries to steal power by disconnecting the voltage supply of one or two phases of the meter externally or by tampering so that no voltage is available to voltage circuit of meter & normal current is flowing in these phases, the meter shall record the energy (kWh and kVAh) at Vref, current available in these phases & average power factor of remaining healthy phases. This event shall be logged

(occurrence and restoration) along with instantaneous readings of energies with date and time.

(xi) If, somehow the voltage circuit of one / two / all phase(s) of meter gets disconnected on its own due to faults in LT distribution network, the meter shall record the energy of that phase at Vref, current available in that phase & UPF.

(xii) The meter shall remain immune for the test of electromagnetic HF/RF defined under test no. 4.0 for EMI/EMC of IS 14697:1999 amended up to date. For any higher signals than the present standards and MSEDCL technical specifications indicated above, the energy meters shall be immune & accuracy of the energy meters shall not get affected.

The separate slot with 10 no. occurrences of EMI/EMC tamper along with date & time stamp shall be provided

7.09.02 TAMPER EVENTS.

7.09.02.01 The meter shall work satisfactorily under presence of various influencing conditions like External Magnetic Field, Electromagnetic Field, Radio Frequency Interference, Harmonic Distortion, Voltage / Frequency Fluctuations and Electromagnetic High Frequency Fields, etc. as per relevant IS

7.09.02.02 The meter shall record the occurrence and restoration of tamper events of current, voltages, kWh, kVAh power factor, event code, date & time etc. listed in Table 32 to 37 of IS: 15959 / 2011

7.09.02.03 In the event the meter is forcibly opened, even by 2 to 4 mm variation of the meter cover, same shall be recorded as tamper event with date & time stamping as per table 37 of IS: 15959 / 2011 and the meter shall continuously display that the cover has been tampered

7.09.02.04 In the event the meter is tempered by remote control device (Jammer) same shall be recorded on Tamper event with date & time stamping with permanent indication as “EI/EC tp” on display which will indicate in auto scroll mode

7.09.02.05 The detection of the tamper event shall be registered in the tamper event register. The no. of times the tampering has been done shall also be registered in the meter

7.09.02.06 Tamper details shall be retrieved by authorized personnel through either of the following:

(i) HHT.

(ii) Remote access through suitable communication network

7.09.02.07 Minimum 300 numbers of events (occurrences & restoration with date & time) shall be available in the meter memory.

The recording of abnormal events shall be on FIFO basis. The unrestored events shall be recorded separately and shall not be deleted till they get recovered (permissible upto 3 months).

All the information of data shall be made available in simple & easy to understand format

7.09.02.08 The threshold values for various tamper are as below.

Sr. No.	Description	Occurrence (With Occ. Time 5 min.)	Restoration (With Rest. Time 5 min.)
1.	PT link Missing (Missing potential)	< 50% of Vref and current in that phase is > 1% of Ib	> 5o% of Vref
2.	Over voltage in any phase	> 115 % of Vref	<115 % of Vref
3.	Low voltage in any phase	< 70 % of Vref	> 70 % of Vref
4.	Voltage Unbalance	> 10 % Vref	< 10 % Vref
5.	CT reverse	--	--
6.	CT Open	Zero Amps in one or two phase and current in at least 1 phase is > 5% of Ib for 15 minutes	> 5 % I_b in the tampered phase for 15 min
7.	Current Unbalance	> 30 % *I_{ref} for 15 min	< 30 % *I_{ref} for 15 min
8.	Current Bypass	> 50 % Iref for 15 min	< 30 % I_{ref} for 15 min
9.	Over Current in any Phase	> 120 % I_b	< 120 % I_b
10.	Influence of permanent magnet or AC/ DC electromagnet / permanent magnet	Immediate	1 minute after removal
11.	Neutral Disturbance	--	--
12.	Power failure	Immediate	Immediate

13.	Very Low PF	--	--
14.	Meter Cover Opening	(2 to 4 mm) Immediate (Occurance only)	

*	Higher of 3 phase currents shall be taken as reference for this purpose.

7.10 QUANTITIES TO BE MEASURED & DISPLAYED

The meter shall be capable of measuring and displaying the following electrical quantities within specified accuracy limits for polyphase balanced or unbalanced loads:

a) Instantaneous Parameters such as phase and line voltages, currents, power factors, overall kVA, kW, kVAr, power factor, frequency etc. as per details given in the table below and IS: 15959 / 2011.

b) Block Load Profile Parameters such as kVAh / kWh / kVArh (lag) /kVArh(lead) / Maximum Demand (MD) in kW / kVA /power factor /phase and line voltages / currents etc. as per details given in the table below and IS: 15959 / 2011.

c) Billing Profile Parameters such as cumulative energy kWh / cumulative kVAh / cumulative energy kVArh (lag and lead), etc. as per details given in the table below and IS: 15959 / 2011.

In addition to above, the meter shall also record the Name plate details, programmable parameters (readable as profile), occurrence and restoration of tamper events along with the parameters (Table 30, 31 and 32, 33, 34, 35, 36, 37 & 39 respectively of IS: 15959 / 2011.

Detail of category wise parameters requirement suitable for LT CT Consumer metering is given in following tables of IS: 15959 / 2011.

Category C1	**Parameter group**	**Annexure Table No.**
LT (CT) consumers Energy Meters	Instantaneous parameters	27
	Block Load Profile parameters	28
	Billing Profile Parameters	29
	Name Plate details	30
	Programmable Parameters	31
	Event Conditions	32 to 37

All logging parameters for each of the event condition for 3 Φ/ 4W	Capture parameters for event (Event Log Profile)	39

7.11 DISPLAY OF MEASURED VALUES

7.11.01 DISPLAY INDICATORS

The supply indication shall be displayed permanently by LED / LCD as a minimum and shall be visible from the front of the meter. In case of non available of voltage to any phase(s), the LEDs of that particular phase shall stop glowing on the LCD display of meter

7.11.02 The permanently backlit display shall show relevant information about the parameters to be displayed. The corresponding non-volatile memory shall have a minimum retention time of 10 years. In the case of multiple values presented by a single display, it shall be possible to display the content of all relevant memories. When displaying the memory, the identification of each parameter applied shall be possible. The principal unit for the measured values shall be the kilowatt-hour kWh for active energy, kVArh for reactive energy and kVAh for apparent energy.

7.11.03 The meter shall have minimum 6 digits (with +/- indication) parameter identifier, permanently backlit Liquid Crystal Display (LCD) with wide viewing angle. The size of digit shall be minimum 10x5 mm. The decimal units shall not be displayed in auto scroll mode. However it shall be displayed in push button mode or alternate mode for high resolution display for testing. Auto display cycling push button is required with persistence time of 9 Seconds. LCD shall be suitable for temperature withstand of 70^0 C; the adequate back up arrangement for storing of energy registered at the time of power interruption shall be provided.

7.11.04 The meters shall be pre-programmed for following details.

a) Voltage Rating: 415 V Ph-Ph

b) CT Ratio: 300 / 5 Amps or 400 / 5 Amps or 600 / 5 Amps or 800 / 5 Amps.

c) MD Integration Period is 30 Minutes real time based.

d) Average power factor with 2 decimal digits shall be displayed.

e) The meter shall Auto reset kVAMD at 24.00 Hrs. of last day of the month as per clause 6.07 (iii) and this value shall be stored in the memory along with the cumulative kWh and kVAh reading.

f) The array of data to be retained inside the meter memory shall be for the last 60 days for a capture period of 30 minutes. Load survey data shall be first in first out basis (FIFO).

g) The display of various electrical parameters in Normal Mode & Alternate mode shall be as per table 27 & 29 (except 8 & 9) of IS: 15959 / 2011 in the sequence given as below. Display other than specified shall be blocked. The scroll period for auto scroll shall be 9 secs.

(A)	**Default Display**
1.	LCD Test
2.	Meter Sr. No.
3.	Real Time Clock – Date & Time
4.	Cumulative Energy – kWh
5.	Cumulative Energy – kWh - TOD Zone A (TZ1)
6.	Cumulative Energy – kWh - TOD Zone B (TZ2)
7.	Cumulative Energy – kWh - TOD Zone C (TZ3)
8.	Cumulative Energy – kWh - TOD Zone D (TZ4)
9.	Cumulative Energy – kVArh - Lag
10.	Cumulative Energy – kVArh - Lag- TOD Zone A (TZ1)
11.	Cumulative Energy – kVArh - Lag- TOD Zone B (TZ2)
12.	Cumulative Energy – kVArh - Lag- TOD Zone C (TZ3)
13.	Cumulative Energy – kVArh - Lag- TOD Zone D (TZ4)
14.	Cumulative Energy –kVArh - Lead
15.	Cumulative Energy – kVArh - Lead- TOD Zone A (TZ1)
16.	Cumulative Energy – kVArh - Lead- TOD Zone B (TZ2)
17.	Cumulative Energy – kVArh - Lead- TOD Zone C (TZ3)
18.	Cumulative Energy – kVArh - Lead- TOD Zone D (TZ4)
19.	Cumulative Energy – kVAh
20.	Cumulative Energy – kVAh - TOD Zone A (TZ1)
21.	Cumulative Energy – kVAh - TOD Zone B (TZ2)

22.	Cumulative Energy – kVAh - TOD Zone C (TZ3)
23.	Cumulative Energy – kVAh – TOD Zone D (TZ4)
24.	Current MD – kVA with occurance date & time
25.	MD - kVA – TOD Zone A (TZ1) with occurance date & time
26.	MD - kVA – TOD Zone B (TZ2) with occurance date & time
27.	MD - kVA – TOD Zone C (TZ3) with occurance date & time
28.	MD - kVA – TOD Zone D (TZ4) with occurance date & time
29.	Number of MD – kVA reset
30.	Rising MD with elapsed time
31.	Three Phase Power Factor – PF
32.	Cumulative Tamper Count
33.	Meter Cover Opening –Occurance with date and time.
(B)	**On – Demand Display (Alternate Display)**
1.	Last date & time of MD - kVA reset
2.	Current – I_R
3.	Current – I_Y
4.	Current – I_B
5.	Voltage – V_R
6.	Voltage – V_Y
7.	Voltage – V_B
8.	Signed Power Factor – R Phase
9.	Signed Power Factor – Y Phase
10.	Signed Power Factor – B Phase
11.	Frequency
12.	High resolution kWh (for calibration)

13.	High resolution kVArh Lag(for calibration)
14.	High resolution kVArh Lead(for calibration)
15.	High resolution kVAh (for calibration)
16.	Rising MD with elapsed time (for calibration/testing)
17.	M1 MD - kVA – TOD Zone A (TZ1) with occurance date & time
18.	M1 MD - kVA –TOD Zone B (TZ2) with occurance date & time
19.	M1 MD - kVA – TOD Zone C (TZ3) with occurance date & time
20.	M1 MD - kVA – TOD Zone D (TZ4) with occurance date & time
21.	M2 MD - kVA – TOD Zone A (TZ1) with occurance date & time
22.	M2 MD - kVA –TOD Zone B (TZ2) with occurance date & time
23.	M2 MD - kVA – TOD Zone C (TZ3) with occurance date & time
24.	M2 MD - kVA – TOD Zone D (TZ4) with occurance date & time
25.	Last Tamper Event with date and time.

h) Other kVA MD values shall be available in reset backup data for 12 months.

i) The meter display shall return to Default Display mode (mentioned above) if the 'Push button' is not operated for 15 seconds

7.12 BILLING DATA, BILLING HISTORY & BLOCK LOAD SURVEY:

7.12.01 BILLING DATA:

The billing data shall be as per table 29 of Annex E of IS: 15959 / 2011 and is summarized as below.

SR. NO.	BILLING PARAMETERS
1.	Billing Date
2.	System Power Factor for Billing Period
3.	Cumulative Energy – kWh
4.	Cumulative Energy – kWh - TOD Zone A (TZ1)
5.	Cumulative Energy – kWh - TOD Zone B (TZ2)

6.	Cumulative Energy – kWh - TOD Zone C (TZ3)
7.	Cumulative Energy – kWh - TOD Zone D (TZ4)
8.	Cumulative Energy – kVArh - Lag
9.	Cumulative Energy – kVArh - Lead
10.	Cumulative Energy – kVAh
11.	Cumulative Energy – kVAh - TOD Zone A (TZ1)
12.	Cumulative Energy – kVAh – TOD Zone B (TZ2)
13.	Cumulative Energy – kVAh – TOD Zone C (TZ3)
14.	Cumulative Energy – kVAh – TOD Zone D (TZ4)
15.	MD – kVA with occurance date & time
16.	MD – kVA – TOD Zone A (TZ1) with occurance date & time
17.	MD – kVA – TOD Zone B (TZ2) with occurance date & time
18.	MD – kVA – TOD Zone C (TZ3) with occurance date & time
19.	MD – kVA – TOD Zone D (TZ4) with occurance date & time

7.12.02 BILLING HISTORY:

The meter shall have sufficient non-volatile memory for recording history of billing parameters for last 12 months. Meter shall record the midnight snapshot of the cumulative energy values and daily MD value. Billing data shall display the history for past 60 days midnight snaps. The days where there is no power on should not be considered

7.12.03 BLOCK LOAD SURVEY:

The Block Load survey data shall be logged on non time based basis, i.e. if there is no power for more than 24 hours, the day shall not be recorded, however if there is no power for few block within one day those block should be displayed with 0 values with marking of power fail indication for that block i.e. for every day when there was power on, **the meter must record 48 blocks**. Whenever meter is taken out and brought to laboratory, the load survey data shall be retained for the period of actual use of meter. This load survey data can be retrieved as and when desired and load profiles shall be viewed graphically / analytically with the help of meter application software. The meter application software shall be capable of exporting / transmitting these data for analysis to

other user software in spreadsheet format (Excel sheet).

The Block Load survey data shall be for specified parameters as per table 28 for 3Φ/4W system of measurement with NEUTRAL as reference point of Annex E of IS: 15959 / 2011. The specified parameters are summarised as below.

SR. NO.	BLOCK LOAD SURVEY PARAMETERS
1.	Real time clock, date and time
2.	Current, I_R
3.	Current, I_Y
4.	Current, I_B
5.	Voltage, V_{RN}
6.	Voltage, V_{YN}
7.	Voltage, V_{BN}
8.	Block energy, kWh
9.	Block energy, kVArh (lag)
10.	Block energy, kVArh (lead)
11.	Block energy, kVAh

7.13 DEMONSTRATION:

The purchaser reserves the right to ask to give the demonstration of the equipment offered at the purchaser's place.

7.14 PERFORMANCE UNDER INFLUENCE QUANTITIES:

The meters performance under influence quantities shall be governed by IS: 14697 / 1999 (amended upto date) and CBIP - 325.

The accuracy of meter shall not exceed the permissible limits of accuracy as per standard IS: 14697 / 1999 (amended upto date).

7.15 HAND HELD TERMINAL (HHT):

7.15.01 To enable local reading of meters data, a DLMS (Device Language Message Specification) compliant HHT shall be provided.

7.15.02 The HHT shall be as per specification given in Annex J of IS: 15959 / 2011.

7.15.03 It shall be compatible to the DLMS compliant energy meters that are to be

procured / supplied on the basis of this specification.

7.15.04 The HHT shall be supplied by the meter manufacturer along with the meter free of cost in the ratio of one for each 100 Nos. meters supplied including user manual and a set of direct communication cords for data downloading to the Laptop or PC for each HHT.

7.15.05 There shall be a provision for auto power save on HHT, which shall force the instrument in the power saving mode in case of no-activity within 5 minutes.

7.15.06 The data shall not be lost in the event the batteries are drained or removed from the HHT.

7.15.07 The HHT shall have a memory capacity of 512 MB SRAM (Static RAM) with battery backup & upgradeable and BIOS / OS on FLASH / EEPROM Memory of 256 KB (RAM-512 MB, FLASH-2GB, SD Card- 8GB with USB facility.

7.15.08 The manufacturer / supplier shall modify the compatibility of HHT with the meter and the base computer system due to any change in language or any other reasons at their own cost within guarantee period.

7.15.09 The CMRI shall be type tested for (a) Tests of Mechanical requirement such as Free fall test, Shock Test, Vibration test, (b) Tests of Climatic influences such as Tests of Protection against Penetration of Dust and Water (IP 6X), Dry Heat test, Cold Test, Damp Heat Cyclic Test, (c) Tests for Electromagnetic Compatibility (EMC), (d) Test of Immunity to Electromagnetic HF Fields and (e) Radio Interference Measurement.

7.15.10 The equipments offered shall be fully type tested at approved laboratory by National Accreditation Board for Testing and Calibration Laboratories (NABL) as per relevant standards within last 5 years from the date of opening of tender & the type test reports shall be enclosed with the offer

7.16 COMPUTER SOFTWARE :

7.16.01 For efficient and speedy recovery of data downloaded through HHT on base computer, licensed copies of base computer software shall have to be supplied free of cost. This software will be used at number of places up to Division level. As many copies of base computer software as required up to Division level shall be provided by Supplier.

7.16.02 The meter shall be capable to communicate directly with laptop computer. Base Computer Software shall be suitable for all types of printers such as dot matrix, inkjet, deskjet and laser printers.

7.16.03 The Base Computer Software shall be "Windows" based & user friendly.The data transfer shall be highly reliable and fraud proof (No editing shall be possible on base computer as well as HHT by any means). The software shall have capability to convert all the data into ASCII format/XML format as per MIOS.

7.16.04 The Base Computer Software should be password protected.

7.16.05 The total time taken for downloading Billing, Tamper and Load Survey Data for 60 days shall be less than or equal to 8 minutes.

7.16.06 Downloading time of only Billing data shall be less than or equal to 20 secs.

7.16.07 The BCS software shall create one single file for the uploaded data, e.g. if CMRI contains the meter readings of, say, 2,000 consumer meters and the said data is uploaded to BCS, then the BCS shall create a single file containing separate records for each consumer meter reading in ASCII format or XML file as per MIOS for individual meter reading.

7.16.08 Meter manufacturers should also need to submit Convert API (API3) as per MIOS universal standard along with Base Computer System free of cost. This API should capable of converting both data i.e. AMR data collected from Read API (API1) and MRI data collected from CMRI.

7.16.09 Also there shall be a provision to give filenames while creating the file.

7.16.10 As and when the meter manufacturer releases new or latest or advanced versions of meter hardware / firmware / software (such as Base Computer System, API3 etc), the same shall be made available to purchaser immediately on the release date free of cost. The latest version shall support all existing hardware / meters in the field. The meter manufacturer should also provide support for changes and integration of Base Computer System and API3.

7.16.11 The meter samples shall be tested by our IT Department for the time required for downloading the data as per specifications and as confirmed by the bidder.

7.16.12 Downloading software shall also be provided so as to install on our Laptop for downloading data directly on Laptop from meter without the use of HHT.

7.16.13 The software provided on laptop or PC shall be compatible to read the data from USB drive and for that purpose a sample cable (1 No.) shall be provided with USB termination. USB being the de-facto standard, this is the requirement.

7.16.14 MSEDCL is procuring large quantity of meters. As such manufacturer have to depute Hardware Engineers and Software Engineers on call basis, who shall have thorough knowledge of meter hardware / software used for downloading and converting so as to discuss the problems, if any, or new development in the hardware / software with Chief Engineer, Testing & Quality Control Cell / Chief General Manager (IT), MSEDCL, Prakashgad, Bandra (E), Mumbai – 400051 without any additional charge.

7.17 CONNECTION DIAGRAM AND TERMINAL MARKING

The connection diagram of the meter shall be clearly shown on inside portion of the terminal cover and shall be of permanent nature. Meter terminals shall also be marked and this marking shall appear in the above diagram. The diagram & terminal marking on sticker shall not be

allowed.

7.18 NAME PLATE AND MARKING OF METERS

Meter shall have a name plate clearly visible, effectively secured against removal and indelibly and distinctly marked with all essential particulars as per relevant standards. Meter Serial Number shall be Bar Coded along with numeric number. The size of bar code number shall not be less than 35x5 mm. The manufacturer's meter constant shall be marked on the name plate. Meter serial number & bar code on sticker will not be allowed. In addition to the requirement as per IS, following shall be marked on the name plate.

(i) Purchase order No & date

(ii) Month and Year of manufacture

(iii) Name of purchaser, i.e. MSEDCL

(iv) Guarantee Five Years

(v) ISI mark

(vi) Category of Meter: **Category C1 – LT CT Consumer Meter**. The lettering shall be bold in 3 mm font.

(vii) A sticker label containing warning notice in Marathi language which is to be stick up on meters front cover or printed on meter name plate with easily readable font size not less than 10 in red colour, which reads as "सावधान ! मीटरला फेरफार करण्याचा प्रयत्न केल्यास अधिकतम वेगाने वीज नोंदणी होणार. मीटर मध्ये फेरफार करणे, सीलतोडणे हा भारतीय वीज अधधधनयम २००३ नुसार कलम १३५/१३८ नुसार दंडनीय अपराध आहे याची नोंद घ्यावी"

7.19 TESTS:

7.19.01 TYPE TESTS:

The meter offered shall have successfully passed all type tests described in the IS: 14697 / 1999 (amended upto date), external AC / DC magnetic influence tests as per CBIP Tech Report 325 with latest amendments and the meter data transfer and communication capability as per IS: 15959 / 2011.

The Type Test Reports shall clearly indicate the constructional features of the type tested meter. Separate type Test Reports for each offered type of meter shall be submitted.

The Type Test Certificate as per IS: 14697 / 1999 (amended upto date) shall be submitted along with the offer. The Type Test certificate carried out during last five years prior to the date of offer shall be valid.

The Type test certificate of metering protocol as per IS: 15959 / 2011 shall be submitted as per tender condition and the same shall not be

more than 36 months old at the time of submission.

All the type test reports shall be got approved from Chief Engineer, MSEDCL, Testing & Quality Control Cell, Prakashgad, Mumbai.

All the Type Tests specified in the technical specifications and as per IS: 14697 / 1999 shall be carried out at laboratories which are accredited by the National Board of Testing and Calibration Laboratories (NABL) of Govt. of India such as ERDA, ERTL, CPRI, etc. Type Test Reports conducted in manufacturers own laboratory though it is NABL and certified by testing institute shall not be acceptable.

Further Purchaser shall reserve the right to pick up energy meters at random from the lots offered and get the meter tested at third party lab i.e. CPRI / agencies listed at Appendix - C of Latest – standardization of AC static electrical energy meters – CBIP publication No. 325 / NPL / CQAL / ERTL / ERDA at the sole discretion of the purchaser at the purchaser's cost. The supplier shall have no right to contest the test results of the third party lab or for additional test and has to replace / take corrective action at the cost of the supplier. For this purpose, the tenderer shall quote unit rates for carrying out each type test. However, such unit rates will not be considered for evaluation of the offer.

Make & type of major components used in the type-tested meter shall be indicated in the QAP.

Additional acceptance test shall be submitted before commencement of supply & get approved from CE (Testing & Quality Control).

7.19.02 ACCEPTANCE & ROUTINE TESTS:

Criteria for selection for such tests and performance requirements shall be as per IS: 14697 / 1999 (Amended upto date).

ALL acceptance tests as per IS: 14697 / 1999 shall be carried out on the meter.

All acceptance tests as per IS: 11731 (Part-2)/ 1986 shall be carried out on the meter body, heat deflection test as per ISO:75, glow wire test as per the IS:11000 (part 2/SEC-1) 1984 OR IEC PUB 60695-2-12, Ball pressure test as per IEC--60695-10-2 and Flammability Test as per UL 94 or as per IS: 11731 (Part-2)/ 1986

All routine tests as per IS: 14697 / 1999 shall be carried out on all the meters.

7.19.03 ADDITIONAL ACCEPTANCE TESTS:

The following additional tests shall be carried out in addition to the acceptance tests specified in IS: 14697 / 1999 (amended up to date)

(a) OTHER ACCEPTANCE TESTS:

i) The meter shall withstand continuously for a period of at least 5

minutes at a voltage of 440 V between phase and neutral without damage / problems.

ii) Meters shall be tested for tamper conditions as stated in this specification.

iii) Glow wire testing for poly-carbonate body.

iv) Power consumption tests shall be carried out.

v) The meter shall comply all the tests for external AC / DC magnetic field as per CBIP Tech Report 325 with latest amendments. Moreover, the magnetic influence test for permanent magnet of 0.5 T for minimum period of 15 minutes shall be carried out by putting the magnet on the meter body. If, during the test, the accuracy of the meter gets affected, then the same shall be recorded as magnetic tamper event with date & time stamping and the meter shall record energy considering Imax and reference voltage at unity power factor in all the three phases. After removal of magnet, meter shall be subjected to accuracy test as per IS: 14697 / 1999 (amended upto date). No deviation in error is allowed in the class index as per IS: 14697 / 1999 (amended upto date) & this specification.

vi) The meter shall withstand impulse voltage at 10 kV.

The tests 6.19.03 (i) to (iv) shall be carried out at factory for each inspected lot at the time of pre dispatch inspection.

The tests 6.19.03 (v) to (vi) shall be carried out on one sample from first lot as per procedure laid down in IS: 14697 / 1999 (amended up to date), CBIP Tech-Report 325 (with latest amendments). The test report shall be got approved from Chief Engineer, Testing & Quality Control Cell before commencement of supply.

7.19.04 For influence quantities like, voltage variation, frequency variation, voltage unbalance etc. the limits of variation in percentage error shall be as per IS: 14697 / 1999 (amended up to date).

7.20 GUARANTEED TECHNICAL PARTICULARS:

The tenderer shall furnish the particulars giving specific required details of meters in schedule `A' attached. The offers without the details in Schedule “A” stand rejected.

7.21 PRE-DESPATCH INSPECTIONS:

All Acceptance tests and inspection shall be carried out at the place of manufacturer unless otherwise specially agreed upon by the manufacturer and purchaser at the time of purchases. The manufacturer shall offer to 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. The

MSEDCL's representative / Engineer attending the above testing shall carry out testing as per IS: 14697 / 1999 & this specification and issue test certificate approval to the manufacturer and give clearance for dispatch.

The first lot of meter may be jointly inspected by the Executive Engineer, Testing Division and the Executive Engineer, Inspection Wing.

7.22 QUALITY CONTROL:

The purchaser shall send a team of experienced engineers for assessing the capability of the firm for manufacturing of meters as per this specification. The team shall be given all assistance and co-operation for inspection and testing at the bidder's works. 3 tender samples shall be kept ready for assessing and testing. The tenderer has to give all facilities for carrying out the testing of these samples.

7.23 MANUFACTURING PROCESS, ASSEMBLY, TESTING:

7.23.1 Meters shall be manufactured using latest and 'state of the art' technology and methods prevalent in electronics industry. The meter shall be made from high accuracy and reliable surface mount technology (SMT) components. All inward flow of major components and sub assembly parts (CT, PT, RTCs / Crystal, LCDs, LEDs, power circuit electronic components etc.) shall have batch and source identification. Multilayer PCB assembly with PTH (Plated through Hole) using surface mounted component shall have adequate track clearance for power circuits. SMT component shall be assembled using automatic pick-and-place machines, Reflow Soldering oven, for stabilized setting of the components on PCB. For soldered PCBs, cleaning and washing of cards, after wave soldering process is to be carried out as a standard practice. Assembly line of the manufacturing system shall have provision for testing of sub- assembled cards. Manual placing of components and soldering, to be minimized to items, which cannot be handled by automatic machine. Handling of "PCB" with ICs / C-MOS components, to be restricted to bare minimum and precautions to prevent "ESD" failure to be provided. Complete assembled and soldered PCB shall undergo functional testing using computerized Automatic Test Equipment.

Test points shall be provided to check the performance of each block / stage of the meter circuitry. RTC shall be synchronized with NPL time at the time of manufacture. Meters testing at intermediate and final stage shall be carried out with testing instruments, duly calibrated with reference standard, with traceability of source and date.

7.23.2 MANUFACTURING ACTIVITIES:

Quality should be ensured at the following stages:

a) At PCB manufacturing stage each board shall be subjected to computerized bare board testing.

b) At insertion stage all components should under go computerized

testing for conforming to design parameters and orientation.

c) Complete assembled and soldered PCB should undergo functional testing using Automatic Test Equipments (ATEs)

d) Prior to final testing and calibration, all meters shall be subjected to aging test (i.e. Meters shall be kept in ovens for 72 hours at 55 0C temperature and atmospheric humidity under real life condition at it's full load current. After 72 hours meters shall work satisfactory to eliminate infant mortality.

e) The calibration of meters shall be done in-house.

f) The bidders shall submit the list of all imported & indigenous components separately used in meter along with the offer.

g) Bought out items:- A detailed list of bought out items which are used in the manufacture of the meter shall be furnished indicating the name of firms from whom these items are procured. The bidder shall also give the details of quality assurance procedures followed by him in respect of the bought out items.

h) List of Plant and Machinery:

Sr. No.	List of Plant and Machinery used for Energy meter Production	
1	Fully automatic testing Bench with ICT for testing link less meters	Routine Testing and Calibration of Meters
2	Semi automatic testing Bench with MSVT	Routine Testing and Calibration of Meters
3	IR Tester	Insulation testing
4	HV Tester	Insulation testing
5	Error calculators	Error testing
6	Long duration Running test set ups	Reliability Testing
7	Reference Meters Class 0.01 accuracy	Error calculation
8	Ultrasonic welding Machines	Welding of meters
9	Automatic Pick and Place Machines	Automatic placing of SMT components
10	Solder Paste Printing Machine	SMT soldering

11	Soldering Furnace IR reflow	SMT soldering
12	PCB Scanner	For testing of PCBs
13	ATE functional tester	For testing of Components
14	Programmers and Program Loaders	Chip Programming Tools
15	CAD PCB designing setups	PCB designing
16	Furnace IR type for Hybrid Micro Circuits	resistance network and HMC manufacturing
17	Laser Trimming Machines	trimming of resistances for higher accuracy measurement
18	Wave Soldering Machines	Wave soldering of PCBs
19	Humidity Chamber	Accelerated testing for Life cycle
20	Dry Heat Test Chamber	Accelerated testing for Life cycle
21	Thermal Shock Chamber	Accelerated testing for Life cycle
22	PRO -E Mechanical Design Stations	Mechanical CAD stations
23	Spark Erosion Tool fabricating Machine	Tool fabrication and Die manufacturing
24	CNC wire Cut Tool Fabrication machine	Tool fabrication and Die manufacturing
25	CNC Milling Machine for composite tool fabrication	Tool fabrication and Die manufacturing
26	Injection Moulding Machine	Moulding of plastic parts
27	Vibration testing Machine	Vibration testing of Meters
28	Glow Wire Test machine	Testing of Plastic Material
29	Fast transient burst testing setup	Type testing of Meters
30	Short term over Current testing setup	Type testing of Meters
31	Magnetic and other tamper testing setups	Tamper Testing

32	Impulse Voltage Testing Setup	Type testing of Meters
33	Composite Environmental testing chambers	Type testing of Meters

7.24 COMPONENT SPECIFICATION:

As per Annexure - I enclosed.

8.00 TECHNICAL SPECIFICATIONS OF CURRENT TRANSFORMERS:

8.01 The Current Transformers shall be resin cast, copper wound primary type confirming to IS: 16227 (amended upto date). Four CTs including one for Neutral shall be casted as one unit.

8.02 The CT set shall comprise of 4 Nos of CTs (for three phases and neutral circuits) moulded separately in resin cast epoxy or equivalent insulating materials. In the event of failure of one CT, it shall be individually replaced.

8.03 Technical parameters:

a) Type : Epoxy Moulded CT Bank
b) Primary Current : 300 Amps or 400 Amps or 600 Amps or 800 Amps
c) Secondary current : 5A
d) Rated continuous thermal factor : 1.2 times
e) Rated voltage : 415 Volts
f) Frequency : 50 Hz
g) Accuracy Class : 0.5s
h) Limits of Error (Current) : As per IS: 16227
i) Limits of Error (Phase displacement) : As per IS:16227
j) Rated burden : 1 VA
k) Instrument Security Factor : ≤ 5
l) Power frequency withstand voltage for secondary : 3 KV rms for 1 minute
m) Impulse withstand Voltage : 10 KV peak for 1 minute
n) Short time withstand current / duration 25 KA for 1 Seconds
o) Temperature rise (Maximum) 70° C

8.04 The accuracy class of the measuring current transformers shall be 0.5s as per the technical requirements

8.05 The CT shall have multi stranded flexible Cu wires of adequate rating and length for secondary side of the CTs.

8.06 The CT 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

8.07 Bar Primary:

8.07.01 The bar shall be fabricated from flat EC grade virgin copper bar. The dimensions of the bar primary shall be marked on the drawing to be submitted by the manufacturer

8.07.02 The manufacturer shall provide good quality GI bolts & nuts of appropriate size for tightening the power cables to the same

8.08 Secondary terminals:

8.08.01 The design and size of the secondary studs shall be such that the terminals are suitable to carry up to 10 Amps continuously.

8.08.02 The manner of fixing the terminals shall ensure adequate and durable contact such that there is no risk of loosening or undue heating

8.09 The complete type tests enumerated in following table as per relevant IS: 16227 (Part 1 & 2) / 1992 amended up to date shall be submitted and got approved from the Office of the Chief Engineer, Testing & Quality Control Cell, MSEDCL, 5th Floor, Prakashgad, Bandra (E), Mumbai – 400 051 as per the tender conditions.

Sr. No.	Name of Test.
1)	Over Voltage Inter-Turn Test
2)	Verification of Terminal Marking & Polarity
3)	Determination of Errors according to the requirements of the appropriate accuracy class
4)	Lightning Impulse Voltage Withstand test
5)	Power Frequency Dry Withstand Test on Primary Winding
6)	Power Frequency Dry Withstand Test on Secondary Winding
7)	Temperature rise test
8)	Instrument Security Factor Test
9)	Short Time Current Test

9.00 TECHNICAL SPECIFICATIONS OF MOULDED CASE CIRCUIT BREAKERS (MCCBs):

9.01 The LT moulded case circuit breakers (MCCBs) shall be generally conforming to IS: 13947 / 1993 as amended upto date.

9.02 The rated current of MCCBs shall be 400 Amps for 300/5 Amps & 400/5 Amps meter, 630 Amps for 600/5 Amps meter & 800 Amps for 800/5

Amps meter

9.03 The MCCB offered shall be type tested at any NABL Lab in accordance with IS: 13947 / 1993 amended upto date.

9.04 A copy of complete Type Test reports for offered MCCBs shall be submitted along with the offer, failing which the offer shall be rejected. The type test report shall not be more than 5 (Five) years old at the time of submission of offer.

9.05 The complete type tests as per relevant IS 13947 / 1993 amended up to date and additional test as per clause no. 8.06 of this specification (Verification of time current characteristics) shall be submitted and got approved from the Chief Engineer, Testing & Quality Control Cell, MSEDCL, Prakashgad, Mumbai – 400 051 as per the tender conditions.

9.06 The MCCBs shall be manually independent and shall have quick make quick brake mechanism. The detailed specification for MCCBs shall be as under.

Sr. No.	Rated current	400 Amps/630 Amps/800 Amps
(1)	Fixed overload release setting (AMP)	100 Amps
(2)	No. of poles	3
(3)	Rated service short circuit breaking capacity (KA) which is equal to ultimate breaking capacity as per IS 13947. (The sequence of operation for this test shall be O - t - CO - t - CO, and t = 3 min.) The test shall be done at 240 V at 0.4 PF. Voltage rating phase to phase 415 V and phase to earth 240 V.	7.5 KA at 0.4 PF
(4)	Power factor for short circuit (Max.)	--- 0.4 (lag) ---
(5)	Utilization category	A

9.07 All nut bolts used for assembly and connections shall be of non-magnetic stainless steel only.

9.08 The LT MCCBs shall have the following time current characteristics.

Multiples of Normal Current Setting	Tripping time
1.05	More than 2.5 hrs.
1.2	More than 10 minutes and less than 2 hrs.
1.3	Less than 30 minutes.
1.4	Less than 10 minutes.
2.5	Less than 1 minute
4.0	Not less than 2 seconds.
6.0	Less than 5 seconds.
12.0	Instantaneous (less than 40 milliseconds).

9.09 For above time / current characteristics, the reference calibration temperature of the breaker shall be 50^0C. Duration, if any, upto 60^0C ambient temperature shall not exceed 10% of the current settings indicated above.

9.10 The short circuit breaking capacity as specified above shall be based on the short circuit test carried out at specified power factors.

For the purpose of this test, the following operation sequence shall be followed:

Break-3 minutes interval-make break-3 minutes interval-make break.

While the above stipulation regarding the test of power factor and the sequence of operation shall be binding, the other procedure for making the short circuit test and circuit etc. shall generally be in accordance with Indian

9.11 MCCB shall have locking facility in “OFF”position.

10.00 GUARANTEED TECHNICAL PARTICULARS:

The tenderer shall furnish particulars giving specific required details of the CT Operated Metering Cabinet, CT Operated Meters, CTs & MCCBs in schedule “A” attached. The offers without duly the details in Schedule `A' stands rejected.

11.00 PROTOTYPE & DRAWINGS:

The successful tenderer shall have to manufacturer the prototype Cabinet for each rating as per these specifications before bulk manufacturing. The tenderer shall intimate the readiness of prototype to the Chief Engineer, Material Management Cell. The representative of the Chief Engineer,

Material Management Cell shall inspect the prototype on any day within 15 days from the date of readiness intimated. The inspection report of prototype jointly signed by manufacturer and MSEDCL representative along with the drawings shall be submitted by the tenderer to the Chief Engineer, Material Management Cell. The Tenderer shall submit the final drawings in line with these specifications and the prototype to the Chief Engineer, Material Management Cell for approval before bulk manufacturing. The approval of prototype & drawings shall be the responsibility of tenderer. No extra period shall be allowed for getting approval of prototype and drawing & this shall be inclusive in the period of delivery schedule given by the tenderer.

12.00 GUARANTEE:

The equipments supplied shall be guaranteed for a period of 66 months from the date of supply or 60 months from the date of installation, whichever ends later. Bidders shall guarantee to repair or replace free of cost the meters, HHTs, CTs, MCCBs and meter boxes (if supplied), which are found defective / inoperative at the time of installation, or become inoperative / defective during guarantee period. Replacements shall be effected within one month from the date of intimation.

13.00 JOINT INSPECTION AFTER RECEIPT AT STORES (Random Sample Testing):

After dispatch of material against inspected lot to various store centers, the RST of sample CT operated meters shall be carried out at each store where the quantities are supplied against the inspected lot. For this purpose, two nos. of samples out of each 100 Nos. received quantity of the Metering Cabinet shall be selected for testing.

The meters shall be tested by our Executive Engineer (Testing) in presence of Supplier's representative jointly for (i) no load condition; (ii) limits of error test; (iii) starting Condition; (iv) repeatability of error test and (v) tamper conditions as per this specification. The 5 days advance intimation will be given to the supplier and if the suppliers fail to attend the joint inspection on the date informed, the Testing will be carried out by our Testing Engineer in absence of supplier's representative. If the meters failed in above random sample testing, the lot will be rejected.

For the purpose of RST of CTs & MCCBs, any one of the stores where metering cabinets are dispatched against inspected lot shall be selected by Chief Engineer, Material Management Cell and the acceptance & routine tests shall be carried out on two numbers of CTs & MCCBs of individual rating each at the MSEDCL Testing Laboratory for the testing facilities available. The balance tests shall be carried out at the nearby third party recognized testing laboratory. The testing results of CTs & MCCBs shall be applicable to the inspected lot quantity supplied to various stores. The following tests are to be carried out as per relevant IS

for MCCBs & CTs:

For MCCBs:

a. Mechanical Operation Tests.

b. Calibration of release.

c. Dielectric Tests.

For CTs:

a. Verification of Terminal marking and polarity.

b. Power frequency dry withstand test on Primary Winding.

c. Power frequency dry withstand Test on Secondary Winding.

d. Over voltage inter turn test.

e. Determination of error or other characteristics according to requirements of the appropriate designation or accuracy class.

If the single item of the meter cabinet fails in RST, the inspected lot of that particular item supplied at various stores shall be rejected.

5 days advance information shall be given to supplier for joint inspection and the date shall not be altered to the convenience or request of supplier. If the supplier / supplier's representative fails to attend on the date fixed, the RST shall be carried out in his absence & results of RST shall be binding on supplier.

14.00 SCHEDULES:

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

Schedule „A' …. Guaranteed and technical particulars. (As per GTP uploaded on e -tendering site)

The discrepancies if any between the specification and the catalogs and / or literatures submitted as part of the offer by the bidders, the same shall not be considered and representations in this regard shall not be entertained. If it is observed that there are deviations in the offer in Guaranteed Technical Particulars, then, such deviations shall be treated as deviations.

ANNEXURE I

COMPONENT SPECIFICATION

Sr. No.	Component function	Requirement	Makes and Origin
1	Current Transformers	The Meters shall be with the current transformers as measuring elements.	The current transformer shall withstand for the clauses under 5 & 9 of IS: 14697 / 1999
2	Measurement or computing chips	The measurement or computing chips used in the Meter shall be with the Surface mount type along with the ASICs.	**USA:** Analog Devices, Cyrus Logic, Atmel, Philips, Teridian. Dallas, ST, Texas Instruments, Motorola, Maxim, National Semiconductors, Freescale, Onsemiconductors **Germany:** Siemens. **South Africa:** SAMES. **Japan:** NEC, Toshiba, Renasas, Hitachi. **Austria:** AMS **Holland:** Philips (N X P) **Taiwan:** Prolific
3	Memory chips	The memory chips shall not be affected by external parameters like sparking, high voltage spikes or electrostatic discharges. There shall be security isolation between metering circuit, communication circuit, and power circuit.	**USA:** Atmel, Teridian, Philips ST, National Semiconductors, Texas Instruments, Microchip, Spanson (Fujitsu), Ramtron. **Japan:** Hitachi, Renasas. **Germany:** Siemens
4	Display modules	(a) The display modules shall be well protected from the external UV radiations. (b) The display visibility shall be sufficient to read the Meter mounted at height of 0.5 meter as well as at the height of 2 meters. (c) The construction of the modules shall be such that the displayed quantity shall not disturbed with	Display TEK/KCE/RCL Display /Suzhou heng Xiamen instruments/ Veritronics **Singapore:** E-smart, Bonafied Technologies, Display Tech, **Korea:** Advantek, Jebon, Union Display Inc., **Japan:** Hitachi, Tianma, Sony, L&G, Holtek, Haijing. **Malaysia:** Crystal Clear Technology.

		the life of display (PIN Type). (d) It shall be trans- reflective HTN (Hyper Twisted Nematic (120°)) or STN (Super Twisted Nematic (160°)) type industrial grade with extended temperature range.	**Hong kong:** Genda **China:** Success, Tianma
5	Communication Modules	Communication modules shall be compatible for the two ports (one optical port for communication with meter reading instruments & the other hardwired RS 232 port to communicate with various modems for AMR)	**USA:** HP, Optonica, National Semiconductors, **Holland/Korea:** Phillips **Japan:** Hitachi **Taiwan:** Ligitek
6	Optical port	Optical port shall be used to transfer the meter data to meter reading instrument. The mechanical construction of the port shall be such to facilitate the data transfer easily.	**USA:** HP, National Semiconductors, Maxim **Holland/Korea:** Phillips **Japan:** Hitachi **Taiwan:** Ligitek
7	Power supply	The power supply shall be with the Capabilities as per the relevant standards. The power supply unit of the meter shall not be affected in case the maximum voltage of the system appears to the terminals due to faults or due to wrong connections	SMPS Type
8	Electronic components	The active & passive components shall be of the surface mount type & are to be handled & soldered by the state of art assembly processes.	**USA:** National Semiconductors, Atmel, Philips, Texas Instruments, BC Component Analog devices, ST, Maxim, Siemens, PHYCOMP, YAGEO, DRALORIC, KOA, WELWYN, OSRAM, Kemet Onsemiconductors, Freescale, Intersil, Raltron, Fairchild,

			Muruta, Agilent, AVX, Abracon, Sipex, Diode Inc., Honeywell, Power Integration, Fox, Roham **Japan:** Hitachi, Oki, AVZ or Ricon, Toshiba, Epson, Kemet, Alps, Muruta, TDK, Sanyo, Samsung, Panasonic **India:** Keltron, Incap, VEPL, PEC, RMC, Gujarat Polyavx, Prismatic, MFR Electronic components Pvt. Ltd., Cermet, CTR. **Korea:** Samsung **Germany:** Vishay, Epcos, Diotech, Kemet, Infineon **Taiwan:** Yageo.
9	Mechanical parts	(i) The internal electrical components shall be of electrolytic copper & shall be protected from corrosion, rust etc. (ii) The other mechanical components shall be protected from rust, corrosion etc. by suitable plating / painting methods.	
10	Battery	Chargeable maintenance free guaranteed life of 10 years.	**USA:** Maxell, Renata **Japan:** Panasonic, Sony, Mitsubishi, Sanyo **Germany:** Varta, Tedirum **France:** Saft **Korea:** Tekcell, Vitzrocell
11	RTC & Micro controller.	The accuracy of RTC shall be as per relevant IEC / IS standards.	**USA:** Philips, Dallas Atmel, Motorola, Microchip, Epson, ST, Teridian **Japan:** NEC or Oki.
12	P.C.B.	Glass Epoxy, fire resistance grade FR4, with minimum thickness 1.6 mm.	

ANNEXURE – II

MSEDCL DEFINED OBIS CODES FOR PARAMETERS NOT PRESENT IN IS 15959/2011

SR. NO.	PARAMETERS	OBIS Code						Interface Class
		A	B	C	D	E	F	No./ Attribute
1.	Cumulative Energy – kVArh - Lag- TOD Zone A (TZ1)	1	0	5	8	1	255	3/2
2.	Cumulative Energy – kVArh - Lag- TOD Zone B (TZ2)	1	0	5	8	2	255	3/2
3.	Cumulative Energy – kVArh - Lag- TOD Zone C (TZ3)	1	0	5	8	3	255	3/2
4.	Cumulative Energy – kVArh - Lag- TOD Zone D (TZ4)	1	0	5	8	4	255	3/2
5.	Cumulative Energy – kVArh - Lead- TOD Zone A (TZ1)	1	0	8	8	1	255	3/2
6.	Cumulative Energy – kVArh - Lead- TOD Zone B (TZ2)	1	0	8	8	2	255	3/2
7.	Cumulative Energy – kVArh - Lead- TOD Zone C (TZ3)	1	0	8	8	3	255	3/2
8.	Cumulative Energy – kVArh - Lead- TOD Zone D (TZ4)	1	0	8	8	4	255	3/2

SCHEDULE 'A'

GUARANTEED TECHNICAL PARTICULARS (TO BE FILLED ONLINE)

ITEM NAME	**LT CT OPERATED ENERGY METERING CABINET OF SMC COMPRISING OF RESIN CAST BLOCK TYPE CTS, MCCBS AND LT AC THREE PHASE, FOUR WIRE 300/5 AMPS OR 400/5 AMPS OR 600/5 AMPS OR 800/5 AMPS CT OPERATED FULLY STATIC AMR COMPATIBLE TOD TRI - VECTOR ENERGY METER**	
SR. NO.	**GTP PARAMETERS**	**GTP VALUES**
A	**LT AC THREE PHASE, FOUR WIRE 400/5 AMPS OR 600/5 AMPS OR 800/5 AMPS CT OPERATED FULLY STATIC AMR COMPATIBLE TOD TRI-VECTOR ENERGY METER AS PER CATEGORY C OF ICS**	
1.	MANUFACTURER'S / SUPPLIER'S NAME AND ADDRESS WITH WORKS ADDRESS	TO BE FILLED BY MANUFACTURER
2.	MAKE AND TYPE OF METER	TO BE FILLED BY MANUFACTURER
3.	APPLICABLE STANDARDS	IS: 14697 /1999 IS: 15959 / 2011, CBIP TECH REPORT 325 IS: 15707 / 2006
4.	METER BEARS ISI MARK	YES
5.	FREQUENCY	50 HZ ±5%
6.	ACCURACY CLASS OF METER	0.5S (FOR ACTIVE AND REACTIVE ENERGY)
7.	RATED VOLTAGE	415 V Ph-Ph or 240 V Ph-N
8.	VOLTAGE RANGE	+15% TO – 30% OF RATED VOLTAGE.
9.	CURRENT RATING	300/ 5 AMPS OR 400/ 5 AMPS OR 600/ 5 AMPS OR 800/ 5 AMPS
10.	BASIC CURRENT (IB) OF METER	5 AMPS

11.	MAXIMUM CONTINUOUS CURRENT (IMAX)	2 TIMES (200 %) Ib
12.	SHORT TIME OVER CURRENT	AS PER IS: 14697 / 1999
13.	STARTING CURRENT OF METER	0.1% of Ib
14.	POWER FACTOR RANGE	ZERO LAG TO UNITY TO ZERO LEAD
15.	POWER CONSUMPTION IN EACH VOLTAGE CIRCUIT	SHALL NOT EXCEED 1.0 W AND 4 VA
16.	POWER CONSUMPTION IN EACH CURRENT CIRCUIT	SHALL NOT EXCEED 2 VA.
17.	POWER SUPPLY IS SMPS & MICRO CONTROL TYPE	YES
18.	STANDARD REFERENCE TEMPERATURE OF METER	27^0 C
19.	MEAN TEMPERATURE CO-EFFICIENT	SHALL NOT EXCEED 0.03%.
20.	KVA MD PROVIDED	YES
21.	OPAQUE METER BASE & TRANSPARENT TOP COVER IS MADE OUT OF UNBREAKABLE, TOUGH, NON- BREAKABLE, HIGH GRADE, FIRE RESISTANT POLYCARBONATE MATERIAL SO AS TO GIVE IT AND QUALITIES.	YES
22.	METER BODY IS MADE OF POLYCARBONATE	YES
23.	POLY CARBONATE BODY OF METER CONFORMS TO IS: 11731 (FV-2 CATEGORY)	YES
24.	POLY CARBONATE BODY MEETS THE TEST REQUIREMENT OF (a) HEAT DEFLECTION TEST AS PER ISO 75 > 150^0C	YES
25.	(b) GLOW WIRE TEST AS PER IS: 11000 (PART 2/SEC-1) 2008 OR IEC PUB 60695-2-12 AT 900^0C	YES
26.	(c) BALL PRESSURE TEST AS PER IEC-60695-10-2	YES
27.	(d) FLAMMABILITY TEST AS PER UL 94 OR IS 11731 (PART-2) 1986	YES

28.	TYPE TEST REPORT NOS. & DATE OF ABOVE (a) to (d)	TO BE FILLED BY MANUFACTURER
29.	PHYSICAL WATER ABSORPTION VALUE OF METER BODY	TO BE FILLED BY MANUFACTURER
30.	THERMAL HDDT VALUE OF METER BODY	TO BE FILLED BY MANUFACTURER
31.	TENSILE STRENGTH OF METER BODY	TO BE FILLED BY MANUFACTURER
32.	FLEXURE STRENGTH OF METER BODY	TO BE FILLED BY MANUFACTURER
33.	MODULUS OF ELASTICITY OF METER BODY	TO BE FILLED BY MANUFACTURER
34.	IZOD IMPACT STRENGTH OF METER BODY NOTCHED AT 23°C	TO BE FILLED BY MANUFACTURER
35.	POLY-CARBONATE OPAQUE BASE AND TRANSPARENT TOP COVER IS ULTRA-SONICALLY WELDED (CONTINUOUS WELDING)	YES
36.	THICKNESS OF MATERIAL FOR METER COVER & BASE	2 MM MINIMUM
37.	METER BODY TYPE TESTED FOR IP51 DEGREE OF PROTECTION AS PER IS: 12063 AGAINST INGRESS OF DUST, MOISTURE & VERMIN	YES
38.	IP51 DEGREE OF PROTECTION AS PER IS: 12063 TEST CERTIFICATE NO. & DATE	TO BE FILLED BY MANUFACTURER
39.	METER COVER IS SECURED TO BASE BY MEANS OF SEALABLE UNIDIRECTIONAL CAPTIVE SCREWS WITH TWO HOLES.	YES
40.	TERMINAL BLOCK IS MADE FROM HIGH QUALITY NON-HYGROSCOPIC, FIRE RETARDANT, REINFORCED POLYCARBONATE / NON-BAKELITE MATERIAL	YES
41.	MATERIAL OF WHICH THE TERMINAL BLOCK IS MADE IS CAPABLE OF PASSING THE TESTS GIVEN IN IS: 1336O (PART 6/SEC 17), ISO 75-1 (1993) & ISO 75-2 (1993) FOR A TEMPERATURE OF 135^{0}C AND A PRESSURE OF 1.8 MPA (METHOD A)	YES
42.	TYPE TEST REPORT NOS. & DATE OF ABOVE	TO BE FILLED BY MANUFACTURER
	TWO SCREWS ARE PROVIDED IN EACH	

43.	CURRENT & POTENTIAL TERMINAL FOR EFFECTIVELY CLAMPING THE EXTERNAL LEADS OR THIMBLES IN TERMINAL BLOCK	YES
44.	MINIMUM INTERNAL DIAMETER OF TERMINAL HOLE	TO BE FILLED BY MANUFACTURER
45.	TERMINATION ARRANGEMENT IS PROVIDED WITH AN EXTENDED TRANSPARENT TERMINAL COVER AS PER CLAUSE NUMBER 6.5.2 OF IS: 14697(AMENDED UPTO DATE) IRRESPECTIVE OF REAR CONNECTIONS	BOOLEAN
46.	TERMINAL COVER IS UNBREAKABLE, TOUGH, NON- BREAKABLE, HIGH GRADE, FIRE RESISTANT POLYCARBONATE & IS MADE OF THE SAME MATERIAL AS THAT OF METER BODY	YES
47.	TERMINAL COVER IS TRANSPARENT	YES
48.	TERMINAL COVER ENCLOSES ACTUAL TERMINALS, CONDUCTOR FIXING SCREWS AND A SUITABLE LENGTH OF EXTERNAL CONDUCTORS AND THEIR INSULATION	YES
49.	TERMINAL COVER IS PROVIDED WITH ONE HINGE	YES
50.	INDEPENDENT SEALING PROVISION IS MADE AGAINST OPENING OF THE TERMINAL COVER AND FRONT COVER TO PREVENT UNAUTHORIZED TAMPERING	YES
51.	UNIDIRECTIONAL SCREWS WITH TWO HOLES FOR SEALING PURPOSE OF TERMINAL COVER ARE PROVIDE	YES
52.	FIXING SCREWS USED ON THE TERMINAL COVER FOR FIXING AND SEALING ARE HELD CAPTIVE IN THE TERMINAL COVER	YES
53.	PROPER SIZE OF GROOVES PROVIDED AT BOTTOM OF TERMINAL COVER FOR INCOMING SERVICE CONNECTIONS	YES
54.	PUSH BUTTONS ARE PROVIDED AS PER SPECIFICATIONS	YES
55.	PROVISION TO PUT AT LEAST TWO SEALS BY UTILITY	YES
56.	PROVISION OF DISPLAY OF HIGH RESOLUTION READING / ALTERNATE MODE	YES

57.	OUTPUT DEVICE FOR TESTING OF METER IS BLINKING LED / LCD WITH CONSTANT PULSE RATE IS PROVIDED	YES
58.	RESOLUTION OF THE TEST OUTPUT DEVICE IS SUFFICIENT TO ENABLE THE STARTING CURRENT TEST IN LESS THAN 10 MINUTES	YES
59.	METER CONSTANT IS INDELIBLY PRINTED ON THE NAME PLATE OF THE METER	YES
60.	METER ACCURACY NOT AFFECTED BY AC / DC / PERMANENT MAGNETIC FIELD UPTO 0.2 TESLA	YES
61.	UNDER INFLUENCE OF ANY MAGNETIC FIELD ABOVE 0.2 TESLA, IF THE ERRORS ARE BEYOND PERMISSIBLE LIMITS, METER RECORDS ENERGY CONSIDERING IMAX AND REFERENCE VOLTAGE AT UNITY POWER FACTOR	YES
62.	METER IS CAPABLE TO WITHSTAND & NOT GET DAMAGED IF PHASE TO PHASE VOLTAGE IS APPLIED BETWEEN PHASES & NEUTRAL FOR FIVE MINUTES	YES
63.	TYPE OF POWER SUPPLY UNIT	SMPS
64.	NON SPECIFIED DISPLAY PARAMETERS IN ARE BLOCKED AND NOT ACCESSIBLE FOR REPROGRAMMING AT SITE	YES
65.	CTS ARE PROVIDED WITH MAGNETIC SHIELDING AND ARE TESTED SEPARATELY PRIOR TO ASSEMBLY	YES
66.	COMPLETE METERING SYSTEM DOES NOT AFFECTED BY EXTERNAL ELECTROMAFNETIC INTERFERRENCE	YES
67.	REAL TIME QUARTZ CLOCK IS USED IN METER FOR MAINTAINING TIME (IST) AND CALENDAR	YES
68.	RTC BATTERY & BATTERY FOR DISPLAY ARE SEPARATE	YES
69.	RTC BATTERY IS NON –RECHARGEABLE TYPE	YES
70.	RTC PRE - PROGRAMMED FOR 30 YEARS DAY / DATE WITHOUT ANY NECESSITY FOR	BOOLEAN

	CORRECTION	
71.	MAXIMUM DRIFT TIME OF RTC PER YEAR	SHALL NOT EXCEED +/- 300 SECONDS PER YEAR
72.	DAY / DATE SETTING & SYNCHRONISATION POSSIBLE THROUGH PASSWORD / KEY CODE	YES
73.	METER WITHSTANDS ANY TYPE OF HIGH VOLTAGE & HIGH FREQUENCY SURGES WHICH ARE SIMILAR TO THE SURGES PRODUCED BY INDUCTION COIL TYPE INSTRUMENTS WITHOUT AFFECTING THE ACCURACY OF THE METER	YES
74.	ACCURACY OF METER IS NOT AFFECTED WITH APPLICATION OF ABNORMAL VOLTAGE / FREQUENCY GENERATING DEVICE SUCH AS SPARK DISCHARGE OF APPROXIMATELY 35 KV	YES
75.	SPARK DISCHARGE OF APPROXIMATELY 35KV CARRIED OUT	YES
76.	METER LOGS UNSATISFACTORY OR	YES
77.	METERING PROTOCOL AS PER TECHNICAL SPECIFICATION	YES
78.	RS 232 & OPTICAL PORTS FOR COMMUNICATION AND WITH SEALING ARRANGEMENT ARE PROVIDED	YES
79.	DEFAULT & MINIMUM BAUD RATE OF RS 232 & OPTICAL PORTS	9600 BPS
80.	INTERNAL NI-MH OR LI-ION OR NI CD MAINTENANCE FREE BATTERY OF LONG LIFE OF 10 YEARS WITH PUSH BUTTON ARRANGEMENT FOR ACTIVATION OF BATTERY OR EXTERNAL BATTERY WITH INDUCTIVE COUPLING ARRANGEMENT WITH INBUILT CHARGER IN THE RATIO OF 1 BATTERY PACK PER 50 NOS. OF METERS PROVIDED	YES
81.	METER PCB IS WIRE LESS & IS MADE BY	SURFACE MOUNTING TECHNOLOGY
82.	METER RECORDS & DISPLAYS TOTAL ENERGY INCLUDING HARMONIC ENERGY	YES

83.	NON VOLATILE MEMORY (NVM) WITH MINIMUM RETENTION PERIOD OF 10 YEARS IS PROVIDED	YES
84.	6 (SIX) TOD TIME ZONES FOR ENERGY AND DEMAND ARE PROVIDED	YES
85.	PROVISION FOR MD INTEGRATION PERIOD OF 30 MINUTES IS MADE	YES
86.	PROVISION THROUGH COMMUNICATION L	YES
87.	PROVISION TO RESET MD THROUGH LOCAL PUSH BUTTON IS PROVIDED	YES
88.	PROVISION FOR AUTO RESET OF MD AT CERTAIN PREDEFINED PERIOD (00 Hrs) IS PROVIDED	YES
89.	ALL ANTI TAMPER FEATURES ARE PROVIDED AS PER SPECIFICATION	YES
90.	METER LOGS TAMPER EVENTS AS PER SPECIFICATION	YES
91.	DETECTION OF TAMPER NO. & TAMPER EVENT IS REGISTERED IN TAMPER EVENT REGISTER	YES
92.	METER KEEPS RECORD OF TAMPER EVENTS FOR MINIMUM 300 EVENTS ON FIFO BASIS	YES
93.	SUPPLY INDICATION IN THE FORM OF LED / LCD DISPLY IS PROVIDED	YES
94.	SUPPLY INDICATION IS VISIBLE FROM THE FRONT OF THE METER	YES
95.	BACKLIT LIQUID CRYSTAL DISPLAY (LCD) OF MINIMUM 6 DIGITS AND MINIMUM 10 MM HEIGHT AND WIDE VIEWING ANGLE IS PROVIDED	YES
96.	SIZE OF DIGITS	MINIMUM 10X5 MM
97.	AUTO DISPLAY CYCLING PUSH BUTTON WITH PERSISTENCE TIME OF 9 SECONDS IS PROVIDED	YES
98.	BACKLIT LIQUID CRYSTAL DISPLAY (LCD) IS SUITABLE FOR TEMPERATURE WITHSTAND OF 70^0C	YES

99.	PUSH BUTTON FOR HIGH RESOLUTION DISPLAY / ALTERNATE MODE OF DISPLAY IS PROVIDED	YES
100.	METER IS PROGRAMMED FOR (A) MD INTEGRATION PERIOD OF 30 MINUTES	YES
101.	(B) AVERAGE POWER FACTOR WITH 2 DECIMAL DIGITS	YES
102.	(C) AUTO RESET KVAMD AT 24.00 HRS. OF LAST DAY OF THE MONTH AS PER CLAUSE 10.00 (III) OF SPECIFICATION	YES
103.	(D) ARRAY OF DATA TO BE RETAINED INSIDE THE METER MEMORY FOR THE LAST 60 DAYS FOR A CAPTURE PERIOD OF 30 MINUTES ON FIRST IN FIRST OUT BASIS (FIFO)	YES
104.	SEQUENCE OF DISPLAY PARAMETERS IS AS PER SPECIFICATIONS	YES
105.	METER RECORDS & DISPLAYS THE QUANTITES AS PER SPECIFICATION	YES
106.	DISPLAY OTHER THAN SPECIFIED IS BLOCKED	YES
107.	OTHER KVA MD VALUES ARE AVAILABLE IN RESET BACKUP DATA FOR 12 MONTHS.	YES
108.	METER DISPLAY RETURNS TO DEFAULT DISPLAY MODE IF 'PUSH BUTTON' IS NOT OPERATED FOR 15 SECONDS	YES
109.	BILLING DATA IS AS PER SPECIFICATION	YES
110.	PROVISION FOR RECORDING HISTORY OF BILLING PARAMETERS FOR LAST 12 MONTHS	YES
111.	PROVISION FOR LOAD SURVEY DATA FOR EVERY 30 MINUTES AND FOR PREVIOUS 60 DAYS FOR SPECIFIED PARAMETERS ON FIFO BASIS	YES
112.	METER STORES NAME PLATE DETAILS AS GIVEN IN THE TABLE 30 OF ANNEX F OF IS: 15959 / 2011 & ARE READABLE AS A PROFILE AS AND WHEN REQUIRED	YES

113.	A DLMS COMPLIANT HHT AS PER ANNEX J OF	YES
114.	A PROVISION FOR AUTO POWER SAVE IS MADE ON HHT	YES
115.	HHT HAS A MEMORY CAPACITY OF 512 MB SRAM (STATIC RAM) WITH BATTERY BACKUP & UPGRADEABLE AND BIOS / OS ON FLASH / EEPROM MEMORY OF 256 KB (RAM-512 MB, FLASH-2GB, SD CARD- 8GB WITH USB FACILITY	YES
116.	HHT OFFERED IS FULLY TYPE TESTED AT APPROVED NABL LABORATORY FOR (a) TESTS OF MECHANICAL REQUIREMENT SUCH AS FREE FALL TEST, SHOCK TEST, VIBRATION TEST	YES
117.	(b) TESTS OF CLIMATIC INFLUENCES SUCH AS TESTS OF PROTECTION AGAINST PENETRATION OF DUST AND WATER (IP 6X), DRY HEAT TEST, COLD TEST, DAMP HEAT CYCLIC TEST	YES
118.	(c) TESTS FOR ELECTROMAGNETIC COMPATIBILITY (EMC)	YES
119.	(d) TEST OF IMMUNITY TO ELECTROMAGNETIC HF FIELDS	YES
120.	(e) RADIO INTERFERENCE MEASUREMENT	YES
121.	TYPE TEST REPORT NOS. & DATE OF HHT	TO BE FILLED BY THE MANUFACTURER
122.	BASE COMPUTER SOFTWARE IS "WINDOWS" BASED & USER FRIENDLY	YES
123.	NO EDITING IN TRANSFERRED DATA IS POSSIBLE ON BASE COMPUTER AS WELL AS HHT BY ANY MEANS	YES
124.	DOWNLOADING SOFTWARE IS PROVIDED TO INSTALL ON OUR LAPTOP FOR DOWNLOADING DATA DIRECTLY ON LAPTOP FROM METER WITHOUT THE USE OF HHT	YES
125.	SOFTWARE PROVIDED ON LAPTOP OR PC IS COMPATIBLE TO READ THE DATA FROM USB DRIVE	YES

126.	CABLE WITH USB TERMINATION PROVIDED	YES
127.	TOTAL TIME TAKEN FOR DOWNLOADING BILLING, TAMPER AND LOAD SURVEY DATA FOR 60 DAYS	SHALL BE LESS THAN OR EQUAL TO 8 MINUTES
128.	DOWNLOADING TIME OF ONLY BILLING DATA	LESS THAN OR EQUAL TO 20 SECS
129.	PERMANENT NATURE CONNECTION DIAGRAM OF THE METER IS CLEARLY SHOWN ON INSIDE PORTION OF THE TERMINAL COVER	YES
130.	DISTINCTLY MARKED NAME PLATE WITH ALL ESSENTIAL PARTICULARS AS PER RELEVANT STANDARDS, CLEARLY VISIBLE, EFFECTIVELY SECURED AGAINST REMOVAL IS PROVIDED ON METER	YES
131.	METER SERIAL NUMBER IS BAR CODED WITH SIZE OF NOT BE LESS THAN 35X5 MM ALONG WITH NUMERIC NUMBER	YES
132.	CLEARLY VISIBLE, EFFECTIVELY SECURED AGAINST REMOVAL AND INDELIBLY AND DISTINCTLY MARKED WITH ALL ESSENTIAL PARTICULARS AS PER RELEVANT STANDARDS NAME PLATE IS PROVIDED ON METER	YES
133.	METER STORES NAME PLATE DETAILS AS GIVEN IN THE TABLE 30 OF ANNEX F OF IS: 15959 / 2011 & ARE READABLE AS A PROFILE AS AND WHEN REQUIRED	YES
134.	CATEGORY OF METER AS “CATEGORY C1 – LT CT CONSUMER METER” IN 3 MM BOLD FONT IS MARKED ON NAME PLATE	YES
135.	WHETHER METER IS TYPE TESTED	YES
136.	TYPE TEST REPORT NOS. & DATE OF METER	TO BE FILLED BY MANUFACTURER
137.	METER PROTOCOL REPORT NOS. & DATES	TO BE FILLED BY MANUFACTURER
138.	ALL ACCEPTANCE & ROUTINE TESTS, AS PER IS: 14697 / 1999 AMENDED UPTO DATE & THIS SPECIFICATION ARE CARRIED OUT ON METER & METER BODY	YES
139.	TRANSPORTATION TEST IS CARRIED OUT	YES

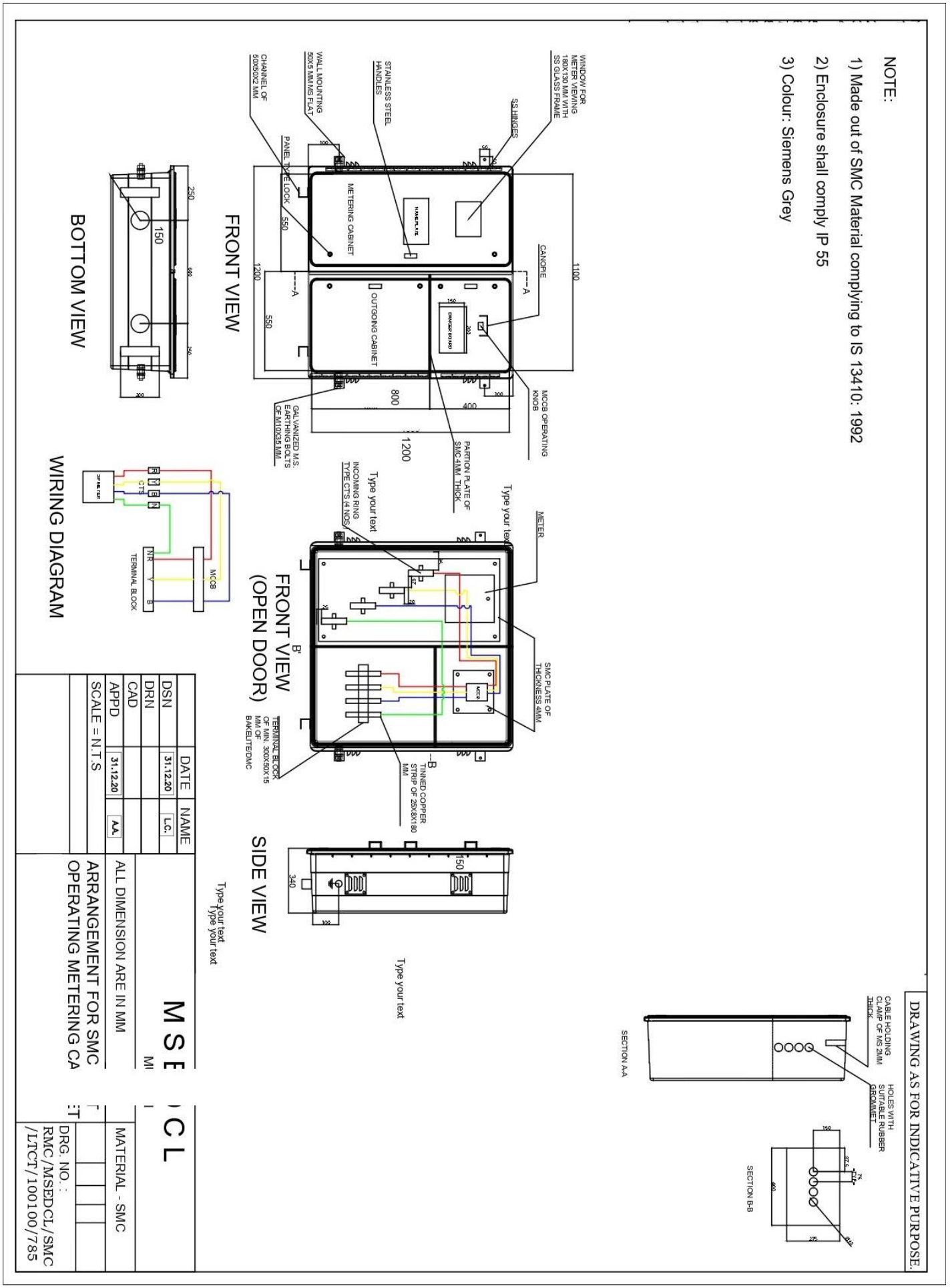
140.	METER & HHT ARE GUARANTEED FOR A PERIOD OF 66 MONTHS FROM THE DATE OF SUPPLY OR 60 MONTHS FROM THE DATE OF COMMISSIONING, WHICHEVER IS EARLIER (YES/NO	YES
141.	GUARANTEE TO REPLACE METERS / HHT FREE OF COST WHICH ARE FOUND DEFECTIVE / INOPERATIVE AT THE TIME OF INSTALLATION OR BECOME INOPERATIVE / DEFECTIVE DURING GUARANTEE PERIOD	YES
142.	FURNISH PRINCIPLE OF OPERATION OF METER OUTLINING THE METHODS AND STAGES OF COMPUTATIONS OF VARIOUS PARAMETERS STARTING FROM INPUT VOLTAGE AND CURRENT SIGNALS INCLUDING SAMPLING RATE IF APPLICABLE	TO BE FILLED BY MANUFACTURER
143.	IN HOUSE TESTING FACILITY IS AVAILABLE FOR (A) AC VOLTAGE TEST	YES
144.	(b) INSULATION RESISTANCE TEST	YES
145.	(c) ACCURACY REQUIREMENT	YES
146.	(d) TEST ON LIMITS OF ERRORS	YES
147.	(e) TEST ON METER CONSTANT	YES
148.	(f) TEST OF STARTING CONDITION	YES
149.	(g) TEST OF NO-LOAD CONDITION	YES
150.	(h) REPEATABILITY OF ERROR TEST	YES
151.	(i) TEST OF POWER CONSUMPTION	YES
152.	(j) TRANSPORTATION TEST	YES
153.	(k) TAMPER CONDITIONS AS PER MSEDCL SPECIFICATION	YES
154.	(l) GLOW WIRE TEST	YES
155.	(m) LONG DURATION TEST	YES
156.	(n) FLAMABILITY TEST	YES
157.	(o) MANUFACTURER HAVE DULY	YES

	CALIBRATED RSS METER OF CLASS 0.1 ACCURACY	
158.	MANUFACTURING PROCESS, ASSEMBLY, TESTING & MANUFACTURING ACTIVITIES AS PER TECHNICAL SPECIFICATION	YES
159.	AGEING TEST FOR 72 HOURS AT 55^{0}C TEMPERATURE AND ATMOSPHERIC HUMIDITY UNDER REAL LIFE CONDITION AT FULL LOAD CURRENT TO ELIMINATE INFANT MORTALITY IS CARRIED OUT	YES
160.	COMPONENT SPECIFICATION AS PER SPECIFICATION	YES
B	**RESIN CAST BLOCK TYPE LT CT**	
161.	TYPE	RESIN CAST BLOCK TYPE
162.	APPLICABLE STANDARD	IS 16227 (Part I & Part II)
163.	RATED CURRENT	300/5 A OR 400/5 A OR 600/5 A OR 800/5 A
164.	RATED SHORT TIME CURRENT	25 KA FOR 1 SECONDS
165.	RATED VOLTAGE	415 Volts
166.	FREQUENCY	50 Hz
167.	VA BURDEN	1 VA
168.	ISF OF CT	≤ 5
169.	CLASS OF ACCURACY	0.5S
170.	PRIMARY WOUND TYPE	TO BE FILLED BY MANUFACTURER
171.	NAME PLATE BODY	TO BE FILLED BY MANUFACTURER
172.	CURRENT DENSITY	MAX 1.6 AMPS/SQ.MM
173.	NUMBER OF PRIMARY TURNS	TO BE FILLED BY MANUFACTURER
174.	NUMBER OF SECONDARY TURNS	TO BE FILLED BY MANUFACTURER
175.	COLOUR OF CT'S	TO BE FILLED BY

		MANUFACTURER
176.	WHETHER TYPE TESTED	TO BE FILLED BY MANUFACTURER
177.	TYPE TEST REPORT NOS	TO BE FILLED BY MANUFACTURER
C	**MOULDED CASE CIRCUIT BREAKER**	
178.	TYPE	TO BE FILLED BY MANUFACTURER
179.	APPLICABLE STANDARD IS: 13947 / 1993 AMENDED UPTO DATE.	IS: 13947 / 1993 AMENDED UPTO DATE.
180.	RATED CURRENT	400 AMPS/630 AMPS/800 AMPS
181.	RATED VOLTAGE	TO BE FILLED BY MANUFACTURER
182.	RATED SERVICE SHORT CIRCUIT RATING	TO BE FILLED BY MANUFACTURER
183.	RATED SHORT CIRCUIT CAPACITY	TO BE FILLED BY MANUFACTURER
184.	OVER LOAD CURRENT SETTING	TO BE FILLED BY MANUFACTURER
185.	UTILIZATION CATEGORY	TO BE FILLED BY MANUFACTURER
186.	WHETHER TYPE TESTED	YES
187.	TYPE TEST REPORT NOS.	TO BE FILLED BY MANUFACTURER
D	**LT CT OPERATED ENERGY METERING CABINET OF SHEET SMC**	
188.	APPLICABLE STANDARD	IS:13410
189.	MATERIAL OF CABINET ENCLOSURE IS SMC (FRP MATERIAL)	YES
190.	GRADE OF SMC	S3
191.	THICKNESS OF ENCLOSURE	MIN 2.5 MM THICK
192.	COLOUR OF ENCLOSURE	SIEMENS GREY
193.	HEIGHT x WIDTH x DEPTH	TEXT
194.	MATERIAL OF TERMINAL BLOCK	BAKELITE
195.	SIZE OF TERMINAL BLOCK AS PER TECHNICAL SPECIFICATION	YES

196.	DEGREE OF PROTECTION	IP 55
197.	MATERIAL OF OUTGOING TERMINAL STRIPS	TO BE FILLED BY MANUFACTURER
198.	SIZE OF OUT GOING TERMINAL STRIPS	TO BE FILLED BY MANUFACTURER
199.	WHETHER CABINET IS TYPE TESTED	TO BE FILLED BY MANUFACTURER
200.	TYPE TEST REPORT NOS.	TO BE FILLED BY MANUFACTURER
201.	EACH CHAMBER DOOR PROVIDED WITH PANEL LOCK & TWO MASTER KEYS FOR OPENING THE DOORS	YES
202.	IN ADDITION TO PANEL LOCKS, ARRANGEMENT FOR PROVIDING PAD LOCKS IS MADE	YES
203.	HINGES ARE PROVIDED FROM INSIDE	YES
204.	FIXING ARRANGEMENT PROVIDED AT THE BACK OF ENCLOSURE.	YES
205.	THICKNESS OF THE FIXING PLATE	TEXT
206.	MINIMUM 3 MM THICK DURABLE RUBBER GASKET PROVIDED AROUND ENCLOSURE	YES
207.	ROOF IS SLOPPING DOWN BACKWARDS WITH 5 DEGREE ANGLE	YES
208.	KNOCK OUT HOLES PROVIDED ON BOTTOM.	YES
209.	SUITABLE SIZE OF BRASS CABLE GLANDS SUITABLE FOR 3½ CORE OF REQUIRED SIZE ALUMINIUM XLPE ARMOURED CABLE PROVIDED	YES
210.	SEPARATE SEALING ARRANGEMENT PROVIDED FOR METER, CT, MCCB & OUTGOING TERMINAL CHAMBER	YES
211.	INTER CONNECTING CABLE FOR CONNECTION FROM CT TO MCCB & FROM MCCB TO OUTGOING TERMINAL BLOCK IS A SINGLE CORE MULTI- STRANDED COPPER CABLE OF SIZE AS PER SPECIFICATIONS	YES
212.	DANGER BOARD IS FITTED / MOULDED ON THE ENCLOSURE	YES
	ALL HOLES FOR INTERNAL CONNECTIONS	YES

213.	THROUGH WHICH CABLES \ LEADS ARE SUPPOSED TO PASS ARE PROVIDED WITH RUBBER REELS	
214.	SEPARATE HANDLES PROVIDED TO ALL THE DOORS	YES
215.	THICKNESS OF THE OUTGOING TERMINAL BLOCK OF BAKELITE / DMC IS MINIMUM 300 X 50 X 15 MM	YES
216.	TINNED COPPER STRIP OF 25 X 8 MM & 180 MM LONG SIZE IS PROVIDED FOR OUTGOING TERMINATION OF CABLES.	YES
217.	MCCB IS SO MOUNTED THAT ITS OPERATING KNOB / LEVER CAN BE OPERATED FROM OUTSIDE WITHOUT OPENING DOOR	YES
218.	SIZE OF TOUGHENED GLASS FOR OBSERVING METER READING PROVIDED FROM INSIDE DOOR	200 X 150 X 2 MM


NOTE:
1) Made out of SMC Material complying to IS 13410: 1992
2) Enclosure shall comply IP 55
3) Colour: Siemens Grey
DRAWING AS FOR INDICATIVE PURPOSE.
FRONT VIEW
BOTTOM VIEW
WIRING DIAGRAM
SIDE VIEW
FRONT VIEW (OPEN DOOR)
SECTION A-A
SECTION B-B
METERING CABINET
OUTGOING CABINET
CANOPIE
MCCB OPERATING KNOB
PARTION PLATE OF SMC 4MM THICK
METER
SMC PLATE OF THICKNESS 4MM
TERMINAL BLOCK
TINNED COPPER STRIP OF 25X8X180 MM
WINDOW FOR METER VIEWING 180X130 MM WITH SS GLASS FRAME
SS HINGES
STAINLESS STEEL HANDLES
WALL MOUNTING 50X5 MM MS FLAT
CHANNEL OF 50X50X2 MM
PANEL TYPE LOCK
GALVANIZED M.S. EARTHING BOLTS OF M10X35 MM
INCOMING RING TYPE CTS (4 NOS)
CABLE HOLDING CLAMP OF MS 2MM THICK
HOLES WITH SUITABLE RUBBER GROMMET
MCCB
TERMINAL BLOCK
Type your text
Type your text
Type your text
Type your text
Type your text
Type your text
DSN
DRN
CAD
APPD
SCALE = N.T.S
DATE
NAME
31.12.20
L.C.
31.12.20
AA.
ALL DIMENSION ARE IN MM
MATERIAL - SMC
DRG. NO. :
RMC/MSEDCL/SMC/LTCT/100100/785