

MATERIAL SPECIFICATIONS CELL

TECHNICAL SPECIFICATION

OF

THREE PHASE METER BOX WITH
MCB ARRANGEMENT FOR THREE
PHASE METER 40-200 AMPS

1.0 SCOPE:

This specification covers design, manufacturing, testing at works and supply of Three Phase Meter Box. The Meter Box shall be made out of CRCA M.S. Sheet confirming to IS: 13947 or Sheet Moulding Compound (SMC) confirming to IS: 13410 / 1992 amended upto date & IS: 14772 / 2000 (amended upto date) for use in electrical distribution system in Maharashtra. The system shall be AC three phase, four wires, 415 V, 50 Hz with effectively grounded neutral. The Meter Box shall be suitable for housing LT AC Three Phase, Four Wire, 40-200 Amp AMR Compatible Static TOD Tri-Vector Energy and MCB in indoor as well as outdoor applications.

2.0 SERVICE CONDITION:

The Meter Box to be supplied against this specification shall be suitable for satisfactory continuous operation under the following service conditions.

Max. & ambient air temperature	50 degree C
Max. relative humidity	100%
Max. annual rainfall	1450 mm
Max. wind pressure	150 Kg/Sq.m
Max. altitude above mean sea level	1000 mtrs
Seismic level (Horizontal acceleration)	0.3 g
Isoceraunic level	50 days/year
Climatic condition	Moderately hot and humid Tropical climate conducive to rust and fungus growth
Ambient temperature for temperature rise	50 deg.C

3.0 APPLICABLE STANDARDS:

Unless otherwise modified in this specification, the meter box shall generally confirm with the provisions of IS: 14772 / 2000 (Amended upto date) and material of construction i.e. for SMC to IS: 13410 / 1992 & for M.S Sheet to IS: 13947 & requirement of this specification.

4.0 DESIGN & CONSTRUCTION:

4.1 The Meter Box shall be made by Deep Drawn OR from Thermosetting

Plastic i.e. glass reinforced polyester sheet moulding compound (SMC) confirming to IS: 13410/ 1992, & requirement of this specification.

- 4.2** Meter Box shall comprise of a moulded base and moulded door manufactured with SMC. The manufacturing process of Box shall be Deep Drawn for CRCA MS Sheet and Hot Press Compression Moulding Process for (SMC).
- 4.3** The base and cover of meter box shall be individually in one piece except for fixing of accessories like hinges, clamp, handles etc.
- 4.4** The meter box shall be so constructed as to have roof tapering down for easy flow of rainwater.
- 4.5** The box / cover shall be drawn from CRCA M.S. Sheet metal thickness not less than 2 mm. Alternatively, if SMC is used then the Meter Box shall be moulded using 100% virgin SMC, grade S-3 material. The box shall be weather proof, unbreakable and scratch resistant & shall have good workmanship. For SMC, the wall thickness of the meter box base shall be minimum 3 mm on load bearing side and 2 mm on all other sides, thickness of cover shall be minimum 2 mm.
- 4.6** The surface of the Meter Box made from CRCA M.S. Sheet shall be properly pre- treated / phosphated in 7-tank process and shall be applied with a powder coating of 40 micron thickness on outer side and inside, Powder coating shall be of Siemens grey colour. Powder coating shall be weather proof & corrosion resistant and suitable for outdoor usage. The Colour of the SMC Meter box shall be Siemens Grey.
- 4.7** 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.
- 4.8** The surface appearance or part of meter box must be smooth, non porous and homogeneous, free from ripples, defects and marks. No fillers or fibres shall be visible at any place.
- 4.9** The meter box shall have base raised by about 20 mm in the box for easy wiring for fixing the meter. The meter screws shall not protrude outside.
- 4.10** The Meter Box shall facilitate wireless data communication with minimal disruption for AMR purpose.
- 4.11** A partition shall be provided inside the base such that box is divided in two

parts. The lower partition shall house the MCB and the upper partition shall house the Meter.

Bottom Compartment should have MCB Mounting arrangement. MCB Bottom compartment door should have opening such that MCB resetting can be performed without opening of door. Door Interlock should be such that the Upper Compartment door can only be opened after opening of Lower compartment door.

- 4.12** The box shall be provided with two separate doors.
- 4.13** The boxes shall be suitable for outdoor application.
- 4.14** Corners of the Meter Box shall be round and not pointed ones.
- 4.15** Doors with locking arrangement shall be provided. Provision of wire seal should be made for 2 seals.
- 4.16** The minimum inside dimensions of the meter box shall be as per enclosed drawing suitable for installation of all types of meters purchased from various meter manufacturers.
- 4.17** Hinges, locking arrangement shall be of stainless steel only for CRCA MS and SMC Boxes.
- 4.18** For SMC, the base and cover must be UV stabilized to ensure that it does not get 'Yellow' over a period of time. It shall not change in colour, shape, size, dimensions when subjected to 200 hrs on UV ageing test as per ASTM: G53 (Cl. No. 9.3), 4 Hours UV at 600 C and 4 Hours Condensation at 500 C. The base and cover shall be capable of withstanding temperature of boiling water for five minutes continuously without distortion or softening.
- 4.19** The Box and Cover should be fixed by concealed stainless steel hinges and hardware from inside in such a manner that it can't be manipulated from outside. The door shall having locking arrangement by way of 4 nos. door closing 'U' Clamp of stainless steel material.
- 4.20** The door of Box shall open 90 deg. Collar of each door (cover) in closed position shall rest on the collar of the body (base) of Box. The collar of the door shall overlap the collar of the body of Box by 8 mm such that direct entry of screwdriver, tool or film is not possible. The cover shall be provided with rubber gasket of suitable size to completely fit to the base. The gasket shall be made out of good quality neoprene rubber. Thickness of rubber lining shall be such that it provides proper sealing between the cover & base of Box to avoid penetration of dust & ingress of water.

- 4.21** The enclosure shall comply with the requirements of IP – 55 for SMC & IP – 55 for CRCA M.S. Sheet as per IS: 12063 or the latest version thereof.
- 4.22** For meter reading, the box shall have window with Toughened Glass of 5 mm thickness fixed with stainless steel frame from inside. Glass shall have scratch proof “MSEDCL” logo on the right side top corner of the glass. This glass shall be fixed from inside of the cover of Meter Box, with single piece stainless steel frame (Glass Holder). The glass has to be fitted with a wrap around single piece rubber ring without joint made from good quality neoprene rubber so that it can withstand weather effect. The box shall have windows of size 140 mm Ht x 350 mm Width.
- 4.23** The mounting arrangement of the meter shall be on MS Patti/Clamp suitable for meter.
- 4.24** For mounting the box on pole/wall, two full length strips shall be welded / fixed on the box. Strips shall be 30 mm wide & 3 mm thick of M.S. sheet.
- 4.25** For cable entry and exit holes of suitable dia with Plastic Gland shall be provided as shown in drawing.
- 4.26** Earthing Bolts of size 25 x 6 mm fitted with the box from inside, shall be provided for external earthing with 2 plain washers, one spring washer & two nuts. Earthing bolt shall have no layer of powder coating and shall be property zinc plated.
- 4.27** The tolerance permissible on the various dimensions of the Box shall be (\pm) 3%. However, the tolerance for the fittings shall be (+/-) 3%
- 4.28** The minimum internal dimensions of the meter box shall be 800 mm height (H) x 500 mm width (W) x 250 mm depth (D) as per enclosed drawing.

5.0 TESTS & TEST CERTIFICATES:

The meter box shall be fully type tested in accordance with the relevant standards and as per MSEDCL requirement. 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 CIPET, EQDC, ERDA, ERTL, CPRI, etc. to prove that equipments meet the requirement of the specification.

The type test report shall clearly indicate the constructional features identifying material of construction and its grade / composition as per

respective IS.

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.

The Box shall be fully type tested as per IS: 14772/2000 (amended up to date) and IS: 13410 / 1992 (amended up to date) and as per requirement of this specification. The type test report shall clearly indicate the constructional features identifying material of construction and its grade / composition as per respective IS and other type tests as well as acceptance tests as per table below.

All the Type Tests shall be carried out from Laboratories which are accredited by the National Board of Testing and Calibration Laboratories (NABL) of Govt. of India such as CPRI, Bangalore /Bhopal, ERDA Baroda, ERTL, EQDC, CIPET to prove that the box meets the requirements of specification. Type Test Reports conducted in manufacturers own laboratory and certified by testing institute shall not be acceptable.

The type test report of meter box having identical constructional and other features carried out during last five years prior to due date of opening of offer shall be valid.

The detailed type test reports shall be furnished with relevant oscillogram and certified drawings of the equipment tests. The offers without type test reports shall be rejected.

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 test reports shall be got approved from the Chief Engineer (Testing & Quality Control), MSEDCL, 5th Floor, Prakashgad, Bandra (E), Mumbai – 400 051 before commencement of supply.

The type test reports of M S Sheet Meter Box as given below shall be furnished with certified drawings to prove that equipment offered meets the requirement of the specification.

Type Tests for M.S. Sheet Meter Box:

Sr. No.	Test	Reference Standard	Required Value
1	Marking	IS 14772:2000, Cl. 7	Manufacturer Name & Danger Logo Screen Printing

THREE PHASE METER BOX WITH MCB FOR THREE PHASE EMBEDDED METER 40-200 A

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
16	Degree of Protection (IP-55)	IS:13947:1993 (Part-1)	IP-55
17	Thickness of Box	-	Other side Min. 2 mm, Base 3 mm
18	Powder Coating Thickness	-	40 Micron

Type Tests for SMC Meter Box:

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

THREE PHASE METER BOX WITH MCB FOR THREE PHASE EMBEDDED METER 40-200 A

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	> 180
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 ⁰ 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 300 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	Water Absorption, % Max	IS:13410-1992	0.20

24	Izod impact strength (Notched), KJ/m ²	IS:13410-1992	55
25	Flexural Strength ,MPa , Min	IS:13410-1992	170
26	Power Arc Resistance Sec. Min.	IS:13410-1992	180
27	Modulus of Elasticity, 10 ³ , MPa	IS:13410-1992	12 to 15
28	Tracking Resistance CTI, Min	IS:13410-1992	1000
29	Dielectric Strength at 90°C in Oil KV/mm	IS:13410-1992	11
30	Dissipation factor (4 days at 80 % RH & 1 KHz)	IS:13410-1992	0.01
31	Heat Distortion Temperature, °C ,Min	IS:13410-1992	150
32	Oxygen Index,% Min	IS:13410-1992	24

6.0 GUARANTEED TECHNICAL PARTICULARS

The tenderer shall furnish the particulars giving specific required details of Meter box in schedule 'A' attached (As per Guaranteed Technical Particulars uploaded on e - Tendering site). The offers without the details in Schedule 'A' stand rejected.

7.0 TESTING & MANUFACTURING 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 meter box as per relevant IS. 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. The Bidder shall have the testing facility of flammability test of V0 for SMC Meter Box.

8.0 MANUFACTURING FACILITIES:

The CRCA M.S. Sheet Meter Box manufacturer shall have following minimum manufacturing facilities in-house to prove his reliability as a

manufacturer of Energy Metering Box.

- (a) Power operating shearing machine.
- (b) Welding machines.
- (c) Assembling tools.
- (d) Assembly lines for fabrication and fitting.

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.

If SMC Meter Box is offered, the tenderer shall have the following minimum manufacturing facilities in house to prove his reliability as a manufacturer of Energy Metering Box.

- (a) SMC material manufacturing machine
- (b) Hydraulic press for hot press compression moulding
- (c) Assembly lines for fabrication and fitting

9.0 GUARANTEE:

The meter box shall be guaranteed for a period of five years from the date of commissioning or five and half years from the date of dispatch whichever is earlier.

10.0 MARKINGS:

The meter box shall have an indelibly and distinctly marked with all essential particulars as per relevant standards. In addition to the requirement as per relevant standard, following information shall clearly & indelibly be embossed on the cover of the meter box.

- a) Purchase order number and date
- b) Year and month of manufacture
- c) Name of Purchaser: MSEDCL
- d) Guarantee: 5 years
- e) Name and trademark of manufacturer
- f) Danger logo (Screen Printed)

11.0 PACKING:

The meter box shall be suitably packed in corrugated boxes in order to avoid damage during transit or handling.

12.0 SCHEDULES:

The tenderer shall fill in the following schedules which are part and parcel of the tender specification and offer and submit along with the offer. If the schedules are not submitted duly filled in with the offer, the offer shall be rejected.

Schedule 'A' – Guaranteed Technical Particulars

The discrepancies, if any, between the specification and the catalogues and/or literatures submitted as part of the offer by the bidders, shall not be considered and representations in this regard will not be entertained.

13.0 DRAWINGS:

The successful bidder shall submit set of all above drawings of the distribution box and its components shall be submitted in triplicate to CE (Dist.) office and get approved before commencement of supply.

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GUARANTEED TECHNICAL PARTICULARS OF SMC THREE PHASE METER BOX WITH MCB MOUNTING ARRANGEMENT FOR THREE PHASE EMBEDDED METER 40-200A

Sr. No.	Particulars	Required	Offered
1	Material	Glass reinforced Polyester Sheet Moulding compound (SMC)	
2	Grade of Material	SMC as per IS:13410-1992	
3	Properties of Material of Construction of Meter Box		
A	Flammability (Ref. Std: UL-94 / IS-11731)	V0	
b	Heat Deflection Temperature (Ref. Std. IS:13411)	150 Deg. C (Minimum)	
c	Exposure to Flame (Ref. Std. IS - 4249)	Self Extinguishing	
d	Melting Point (Ref. Std. IS-13360)	Does not Melt	
4	Constructional features of the box:		
4(a)	Clear minimum inside dimensions of Meter Box		
i.	Height	800 mm	
ii.	Width	500 mm	
iii.	Depth	250 mm	
iv.	Thickness of Meter Box	3 mm on load bearing side and 2 mm on all other sides	
v	Top Compartment	To House Meter	
vi	Bottom Compartment	To House MCB	
vii	Partition Plate	2.5 mm thick SMC Partition Plate between two compartment	
4(b)	Window on front door:		
i.	Material of Viewing Window	Toughened Glass	
ii.	Thickness of Toughened Glass	5 mm (Min.)	
iii.	Size of opening (Min)	140 x 350 mm (\pm 5 mm)	
iv.	Fixing method	Fixed from inside with stainless steel frame	
v	Window for Operating MCB	Cut out for MCB knock out for Four Pole	

THREE PHASE METER BOX WITH MCB FOR THREE PHASE EMBEDDED METER 40-200 A

5	Locking Arrangement	4 nos. door closing 'U' Clamp of stainless steel material.	
6	Sealing Arrangement	Holes for Wire Seal	
7	Earthing Bolt	Earthing Bolt of size M6 x 25 mm with 2 Nos. Washer and 2 Nos. Nut.	
8	Wire Entry	Cable Entry holes with Plastic Gland	
9	Meter Mounting Arrangement	MS Patti/Clamp	
10	MCB Mounting Arrangement	G.I. Clamp for MCB Mounting	
11	Ingress Protection (IP)	IP-55	
12	Colour of Meter Box	Siemens Grey	

**GUARANTEED TECHNICAL PARTICULARS OF DEEP DRAWN CRCA MS
SHEET THREE PHASE METER BOX WITH MCB MOUNTING
ARRANGEMENT FOR THREE PHASE EMBEDDED METER 40-200A**

Sr. No.	Particulars	Required	Offered
1	Material	CRCA M.S. Sheet	
2	Grade of Material	As per IS: 13947	
3	Manufacturing Process	Deep Drawn	
4	Meter Box Pre-Treated/ Phosphated	7 Tank Process	
5	Powder Coating on inner and outer side of box	40 micron thickness	
6	Powder Coating	Weather Proof and Corrosion Resistant and suitable for outdoor use	
Constructional features of the box:			
(a)	Clear minimum inside dimensions of Meter Box		
i.	Height	800 mm	
ii.	Width	500 mm	
iii.	Depth	250 mm	
iv.	Thickness of Meter Box	2.0 mm	
v	Top Compartment	To House Meter	
vi	Bottom Compartment	To House MCB	
vii	Partition Plate	2 mm thick MS Partition Plate between two compartment	
(b)	Window on front door:		
i.	Material of Viewing Window	Toughened Glass	
ii.	Thickness of Toughened Glass	5 mm (Min.)	
iii.	Size of opening (Min)	140 x 350 mm (\pm 5 mm)	
iv.	Fixing method	Fixed from inside with stainless steel frame	
v	Window for Operating MCB	Cut out for MCB knock out for Four Pole	
8	Locking Arrangement	4 nos. door closing 'U' Clamp of stainless steel material.	
9	Sealing Arrangement	Holes for Wire Seal	

THREE PHASE METER BOX WITH MCB FOR THREE PHASE EMBEDDED METER 40-200 A

10	Earthing Bolt	Earthing Bolt of size M6 x 25 mm with 2 Nos. Washer and 2 Nos.Nut.	
11	Wire Entry	Cable Entry holes 2 Nos. with Plastic Gland	
12	Meter Mounting Arrangement	MS Patti/Clamp	
13	MCB Mounting Arrangement	G.I. Clamp for MCB Mounting	
14	Ingress Protection (IP)	IP-55	
15	Colour of Meter Box	Siemens Grey	

THREE PHASE METER BOX WITH MCB FOR THREE PHASE EMBEDDED METER 40-200 A

