

**Technical Specifications for L.T. SINGLE FEEDER DISTRIBUTION BOX with
M.C.C.Bs. suitable for 100 KVA DTR**

1. SCOPE:

Specification covers the design, manufacture, testing at works and supply of Distribution Boxes made out of **CRCA MS** for controlling the L.T. feeders from the L.T. side of Distribution Transformers. The system shall be A.C. 3 phase, 4 wire, 433 V, 50 HZ with effectively grounded neutral.

2. CLIMATE CONDITIONS:

The climate conditions under which the equipment to be supplied against this specification shall be suitable for satisfactory continuous operation as indicated in clause no.23.1 of General and Financial terms and conditions for supply of material.

3. SYSTEM DETAILS:

Distribution Boxes are meant for control and protection of Distribution Transformers with relevant parameters as under:-

S.N.	Particulars	Details
1.	KVA rating	100 KVA
2.	Voltage	433 V, 3 Ph, (3x 250 V)
3.	Frequency	50 HZ
4.	Phases	3 phase, solidly grounded neutral
5.	Approximate full load current of transformer	133 A
6.	No. of Outgoing circuits	1 no.

4. Applicable Standards:

- a. IS: 13947/1993 (Part2)(amended upto date) for L.T. MCCBs.
- b. IS: 8623/1993 (amended upto date) for enclosure Box & for degree of protection provided by enclosures of electrical equipments.
- c. IS:5 /2007 - Colours of Ready Mixed paints and Enamels.
- d. IS: 13871/1993 – Powder coatings – specifications
- e. IS : 6005/1998 – Code of Practice for phosphating of iron and steel.

5. MANUFACTURE/CONSTRUCTION OF BOXES:

- a. Distribution Boxes shall have single pole MCCBs on outgoing circuit (Single circuit/feeder) with necessary interconnecting Bus Bars/ Links.
- b. Standard General Arrangement of MCCBs, Neutral Links, Bus Bars, connecting links, Cable termination arrangement etc inside the Box.

6. INCOMING CIRCUIT – Bus bar of size 25 X 10 mm should be provided in the incoming side.

7. OUTGOING CIRCUIT (Single feeder):

MCCBs

Each distribution box shall have 3 nos. of single-pole MCCBs in 100 KVA Box to protect outgoing circuits. MCCB shall be conforming to this specification. The bidder shall indicate the makes and types of MCCBs offered in GTP. The bidder shall submit

Type Test Report of the MCCB as specified in Cl. No. 12.3. The color of MCCBs for 100 KVA distribution shall be Dark admiral gray.

MCCB shall have quick make quick break mechanism. Making of MCCB shall only be manual but breaking of MCCBs shall be electrical as well as manual. MCCB shall be of reputed make preferably of L&T, Siemens, Havells, MDS and ABB.(Make must be specified in the tender). There should be a metallic/heat resistant insulating barrier between the individual M.C.C.Bs so that the heat generated during any fault inside the Box should not pass to the other M.C.C.Bs.

The detailed specification for MCCBs shall be as under.

S.N	Particulars	Details
1.	KVA rating	100 KVA
2.	Rated current	150 A
3.	Fixed overload release setting (A)	130 A
4.	No. of poles	Single pole
5.	Rated service short circuit breaking capacity (kA) which is equal to ultimate breaking capacity as per IS 13947 /1993	10 KA at 0.4 p.f . (lag)
	The sequence of operation for this test shall be, O - t - CO - t - CO, and t = 3 min.). The test shall be done at 250V at 0.4 p.f. (lag). Voltage rating phase to phase 433 V and phase to earth 250V.	
6.	Power factor for short circuit (Max.)	0.4 lag
7.	Utilization category	A
8.	Rated Insulation Voltage	660 V

The rated service short circuit breaking capacity as specified in Sr. No. 5 above table shall be based on the rated service short circuit test carried out at specified power factors.

The MCCB should be front operated single pole type. The casing of MCCB shall be of Non –tracking and heat resistant insulating material of Dough Moulding Compound (DMC) of D3 Grade as per IS:13411/1992, no separate enclosure is required. To extinguish the arc immediately in MCCBs, archutes with minimum 8 strips shall be provided.

While the above stipulation regarding the test 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 the Indian Standard applicable to the type of circuit breakers under test.

TIME CURRENT CHARACTERISTICS of MCCBs:

The L.T. MCCBs shall have time current characteristics as follows:

Multiple 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 milli seconds.)

For above time/current characteristic, the reference calibration temperature of the breaker shall be 50°C. Duration, if any, upto 60°C. ambient temperature shall not exceed 10% of the current setting indicated above.

8 BUSBARS AND CONNECTIONS:

The Incomer feeder of the distribution box, with phase sequence RYB to be maintained. The phase busbars and feeder droppers from busbars shall be of electric grade aluminum. The phase busbar strips shall be of size 25X10 mm for 100 KVA. Feeder droppers shall be 25X10 mm. Incomer dropper of 25 x 10 mm cross section for 100 KVA box be provided. All busbars and droppers shall be properly drilled and deburred. Each busbars shall be of one single strip without any joint. At the joint with copper part the aluminum end piece shall be bimetallic with sufficient thickness.

Busbars shall be provided with durable PVC insulating sleeves of standard colour code for different phases. Corrugated/Spring & Plain washers shall be used for Nut-Bolt connections.

Busbars shall be mounted on suitable size support insulators which should be tightened from inside. i.e. once fitted, should not be able to removed.

The bidder shall submit drawing along with all the clearances and dimensions (in mm) to meet this specification invariably. Other clearances shall be as per requirement of IS: 4237/1982 amended up-to date.

The bus bars shall be conveniently placed so as to provide adequate clearance from the body of the box conforming to I.E. Rules applicable for L.T. supply. There should be Heat Shrinkable bus bar insulation tubing of Red Yellow-Blue & Black.

9 ENCLOSURE:

The Box & Doors shall be made up of CRCA MS sheet of 2mm thickness. The distribution box should have two doors. After opening the first door the MCCB on off switches and RYB light indications should be visible. After opening this second door only the busbar arrangement and the complete MCCBs should be visible.

The manufacturing process of Box shall be either Deep Drawn process or Fabrication.

In case of Deep drawn type distribution boxes, the rounding of corners and slope on Top shall be as shown in the drawing. No joints in the body of the Box are permitted in Deep Drawn Process. In case of fabricated box sharp corners & one side slope will be acceptable. The fabrication boxes, involving welding, shall not have more than two joints. The welding process of both type of distribution boxes shall be done by MIG (Metal Inert Gas) welding and workmanship/finishing should be good enough.

For Fabrication Box : The general overall clear dimensions of 100 KVA Distribution Box shall be 600 x 800 x 300 (LXHXW)mm. The height of distribution boxes on front side shall be 850 mm and backside shall be 825 mm.

The Base and doors of enclosure shall be individually in one piece without any welding, except for fixing of the accessories like hinges, clamps, mounting clamps, bolts etc.

100 kVA boxes shall have one door fixed on right side of the box with four hinges provided from inside of box.

Base and doors shall have flange / collars as shown in drawing. Collar of Base and doors shall overlap by 10mm. Rubber gasket of suitable size shall be provided in between base and doors, such that it provides proper sealing between the door and base of box to avoid penetration of dust & ingress of water. Degree of protection shall be **IP- 33** as per IS- 8623/1993 (amended up to date). Rubber Gasket shall be fixed with suitable adhesive. Four hinges on each side shall be provided from inside of the box to fix the doors. Hinges shall be minimum 50 mm in length & made from 2mm thick sheet. Hinge stainless steel pin diameter shall be 4mm. The hinges shall not be visible from outside.

The MCCBs shall be housed inside the enclosure. MCCBs operating handle shall be accessible only after opening of the door.

Four set of Louvers (two sets on each side) of suitable size shall be provided as shown in drawing. The louvers shall be provided such that heat dissipation is proper. The perforated sheet of 20 SWG with 2.5 mm holes shall be welded from inside of the louvers.

Mounting of components inside the enclosure shall allow free air circulation keeping the clearances as per drawings attached with specification.

Locking Arrangement to the Box:

The locking arrangements to boxes shall be such that the door (s) shall be automatically closed without applying external force. The door should be front operated with a common handle provided outside the door. In addition to this, C&R panel door locks shall be provided to the door at top & bottom. Key way shall be provided on the door for operating the lock from outside. Key way shall be provided with cover. A nylon washer shall be provided between the handle and door to avoid penetration of water.

The bimetallic lugs of adequate size, as per enclosed specification & drawing, shall be provided. Clearances, Creepages and convenience in making connections shall be ensured.

The electric grade aluminum Neutral Busbar of 300 x 30 x 8 mm for 100 KVA box capable of carrying for full load current. Neutral Busbar shall be isolated with respect to body. The bimetallic lugs of adequate size, as per enclosed specification & drawing, shall be provided. Neutral Busbar shall be as shown in the drawing attached with the specifications.

Two galvanized earthing Bolts of M12 x 50 mm size shall be welded from inside and projecting outside of the box as shown in the drawing. There should be no powder coating on the earthing bolts. Two Nuts with washers shall be provided on each bolt.

Three bottom plates of the size 125mm x 125mm fixed with four screws from inside shall be provided for incoming and outgoing cables. Bottom plates shall be provided with suitable holes and rubber glands for the cables. Rubber glands shall be made such that internal diameter of glands provided for cables should be closed with the rubber film of minimum 1mm thickness. Cable will go through the glands by cutting the film of the glands. Bottom plates shall also be provided with cable clamps.

Necessary fixing arrangement shall be provided at the back of the enclosure to ensure proper fixing on single pole structure by means of suitable clamps at 2 places.

Danger Board with specifications shall be riveted on the box as per IS:2551. Danger board marking by painting shall not be accepted.

All the components inside the Box shall be mounted on CRCA MS strips of 2 mm thickness. The mounting strips shall be provided with required bends or ribs to give the extra strength and shall be powder coated or zinc plated.

All joints of current carrying parts shall be bolted with 8.8 grade High Tensile MS Nuts & Bolts, Corrugated/spring & Plain Washers. The nuts & bolts should be of hexagonal type. All the nuts, bolts & washers should be properly zinc plated.

Each distribution box shall be supplied with proper packing in five ply - corrugated box.

Name plate having details such as Month & year of manufacturing, Name of manufacturer/Trade mark, Sr. No, and rating of Distribution box, shall be riveted on the Distribution box door. The name plate should be of stainless steel of thickness 1 mm. APEPDCL logo shall be embossed on the door of the distribution box. The letter size, font, height & length shall be suitable to the size of distribution boxes such that slogan can be clearly readable from 30 feet distance. All above shall be so placed to give box good look.

Incoming and outgoing circuit should be duly highlighted with paint by stencil printing.

Adequate slope on the top of box shall be provided to drain out rainwater from the top.

1 No. MCCB in spare should be invariably provided with each box.

Good-quality plastic sticker leaflet should be pasted inside of distribution box door. The matter of instruction leaflet is given along with this specification. All the instructions in leaflet should be in English/Telugu language.

10 CABLE TERMINATION:

Adequate size of Bimetallic lugs shall be provided for 3½ core, LT XLPE cable on incoming side and outgoing side for 100 boxes as below:

	Incoming side	Outgoing Side
100 KVA	120 sq.mm	70/95 sq.mm

11 FINISHING OF DISTRIBUTION BOX:

The outer side and inside surface of the box shall be properly Pre-treated / Phosphated in seven tank process as per IS: 6005 and shall be applied powder coating of minimum

40 micron thickness. The Colour shade of **light gray** for 100 KVA box as per IS: 5/2007 (Colours of Ready Mixed paints and Enamels) shall be applied inside & outside surface of the box. Powder coating shall be suitable for outdoor use, conforming IS: 13871/1993 – Powder coatings. The process facility shall be in-house to ensure proper quality for outdoor application.

12 TESTS & TEST CERTIFICATES:

In case of bought out items, routine and acceptance tests as per relevant IS and this specification shall be carried out at the original manufacturers' works.

Routine Test (Carried out on all boxes):

A) Overall Dimensions Checking.

12.1.2. Insulation Resistance Tests.

12.1.3 High Voltage Test at 2500 V, 50 Hz AC for one minute.

12.1.4. Operation Test on MCCB .

Acceptance Tests (on complete Distribution Box):

Following tests shall be carried out as per acceptance tests in addition to routine tests on one random sample of each rating out of the lot offered for inspection:

i) 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 distribution box with all assembly of MCCBs shall be kept in an enclosure such that the temperature outside the box shall be maintained at 50 ° C.

20% more current than transformer secondary capacity i.e. for 63 KVA Distribution Transformers full load current 84A, 20 % more is 100 A shall be kept in incoming circuit keeping outgoing circuits short, till the temperature stabilizes and maximum temperature rise should be recorded.

ii) Time-Current Characteristics

The MCCB should be tested for time current characteristics at 1.05 & 1.2 times of overload release setting current and should pass the requirement given in clause- 7.2.

TYPE TESTS :

I ON COMPLETE BOX:

- a. **Temperature rise test:-** The temperature rise test should be carried out as per IS: 8623 -1993
- b. High voltage test shall be carried out as per IS:8623/ 1993 amended upto date.
- c. Short Time Withstand Current Test on Distribution Box shall be carried out as per IS 8623 or latest version.
- d. The Distribution Box should be subjected to Short Time Withstand Current Test for 4KA for 2 seconds for 63/100 KVA Box) all the circuits independently. The test should be carried out after by- passing MCCBs.
- e. Degree of protection for **IP- 33** on complete box shall be carried out as per IS: 13947/1993 or the latest version thereof.
- f. Time /current characteristic test on MCCBs shall be carried out as per clause 7 of this specification as stated above.

II) ON MCCB:

All type tests on MCCB as per IS-13947 amended upto date shall be carried out.

12.4 TYPE - TEST CERTIFICATES:

The Distribution Box MCCB offered shall be fully type tested as per relevant IS and this specification. The detailed Type Test Reports shall be furnished with relevant oscillogram and certified Drawings of the equipment tested.

All the type tests shall be carried out from laboratories accredited by National Accreditation Board of Testing and Calibration Laboratories (NABL), Department of science & technology , Govt. of India to prove that the complete Box, MCCB meet the requirements of the specification. The tenderer should also furnish certificate from laboratories that laboratories are having all the requisite test facility available in house. The type test Reports conducted in manufacturers own laboratory and certified by testing institute shall not be acceptable.

The type test certificate carried out during last five years from the date of opening of the tender shall be valid.

13. TESTING & MANUFACTURING FACILITIES :

The Tenderer must clearly indicate what testing facilities are available in the works of manufacturer and whether the facilities are adequate to carry out all Routine & Acceptance Tests. These facilities should be available to APEPDCL Engineers, if deputed to carry out or witness the tests in the manufacturer's works. The tenderer must have all the in-house testing facilities to carry out the acceptance tests on the Box.

The tenderer shall furnish detailed process of manufacturing & Powder coating. In case box manufacturing/Powder Coating is to be carried out from outside agencies, the tenderer shall furnish the facilities available with the sub-vendor. Undertaking from sub-vendor, regarding providing services of these facilities, shall be submitted.

14. PROTOTYPE SAMPLE:

Every bidder should send one prototype sample unit as per the specification along with Bid documents to CGM (P&MM) / Visakhapatnam.

15. INSPECTION:

All routine & acceptance tests and inspection of material shall be carried out at the place of manufacturer. The manufacturer shall offer the Inspector (representing the purchaser) all reasonable facilities, free of charge at the time of Inspection.

The representative of the APEPDCL/3rd party shall carry out inspection.

16. REJECTION:

The purchaser may select one box at random from a lot of 100 Distribution Boxes or part thereof as may be supplied to stores from time to time. The Box so selected must pass all the Type Tests mentioned above otherwise the whole lot of 100 boxes or part thereof, from which the box is selected, will be rejected. For this purpose, lots will be made, consisting of 100 boxes per lot of each rating, at stores after supply.

The testing under this clause will be done in any Laboratory of the APEPDCL's choice. Notice of such tests will be given by the APEPDCL to supplier. The supplier is at liberty to be present during the testing.

- 17.** The successful bidder shall submit set of all above drawings of the distribution box and its components shall be submitted in triplicate to CGM (P&MM) office and get approved before commencement of supply.

18) COMPLETENESS OF EQUIPMENT: - Any fittings accessories or apparatus which may not have been specifically mentioned in this specification but which are usually necessary in equipment of similar plant shall be deemed to be included in the specification and shall be

supplied by the Tenderer without extra charge. All plant and equipment shall be complete in all details whether such details are mentioned in the specification or not. Lugs of suitable size shall be provided for incoming and outgoing sides where ever necessary.

In the case of components for which specific type tests or routine tests are not given in this specification, The Supplier shall include a list of the tests normally required for these components. All materials used in the Contract shall withstand and shall be certified to have satisfactorily passed such tests.

**GURANTEED TECHNICAL PARTICULARS for
100 KVA L.T. Single Feeder Distribution Boxes with MCCB
(To be submitted by the bidder)**

Sr.NO	GTP Parameters	
1	Name of Manufacturer	
2	Applicable Reference standards	
3	Process of manufacturing	
4	Clear Dimensions of box	
5	Rating of distribution Box in KVA	
6	Thickness of Enclosure (in mm)	
7	Material of Enclosure	
8	Rated Voltage in Volts	
9	Colour shade of Distribution Box (Inside and Outside)	
10	Degree of protection IP-33 as per IS-8623/1993 (amended upto date) of enclosure	
11	Sets of Louvers provided to the box.	
12	Size of perforated sheet 20 SWG CRCA MS with 2.5mm holes shall be fitted from inside of the louvers	
13	Type, Size & material Hinges provided to the doors	
14	Hinges pin diameter & material	
15	Danger Board shall be riveted on the box door as per IS 2551 (Yes/No)	
16	No. Doors & handle provided to the box	
17	Locking arrangement provided to the box	
18	Simple C&R panel locking arrangement provided to the box (YES/NO)	
19	Detailed Name plate provided (Yes/No)	
20	Material & thickness of name plate	
21	Before powder coating pretreating / phosphating of boxes i.e. in seven tank process shall be carried out as per relevant IS (Yes/No)	
22	Whether manufacturer have seven tank process facility and powder coating inhouse (YES/NO)	
23	In case facility of manufacturing & powder coating of boxes is not available with bidder, undertaking to provide it by sub vendor shall be submitted. (YES/NO)	
24	Welding process shall be MIG (Metal Inert Gas) (Yes/NO)	
25	Material & Size of Busbar	
26	Material & Size of neutral busbar	
27	Busbar support insulator provided as per drawings (Yes/No)	
28	Size & No. of Earthing nutbolts provided	
29	No. & Size of Bottom plates provided to the Box	
30	Fixing arrangement provided	
31	Size of component mounting strip	
32	Packing of box	

33	Handle/ puller provided with each Distribution Box (Yes/No)	
34	Make of Bimetallic lugs	
35	Reference standard applied for Bimetallic lugs	
36	Name of manufacturer of MCCB	
37	Reference of standard for MCCB	
38	Type designation (i.e.Fixed /Variable)	
39	Type of overload release	
40	No.of Poles	
41	Rated current (amps)	
42	Rated Voltage & Frequency	
43	Rated short Circuit Breaking capacity in KA	
44	The archutes provided in MCCB as technical specifications	
45	Ultimate Breaking capacity	
46	Utilization category	
47	Overload release setting provided in Amps	
48	Colour of MCCB	
49	All Type tests carried out on Distribution Box with assembly, MCCB at NABL as per Technical specification and relevant IS shall be submitted along with tender document (Yes/No).	

Bill of materials

1	Thickness of enclosure : CRCA MS Sheet of 2 mm Thickness
2	100 KVA Box dimensions - 600 x 800 x 300 (LXHXW) mm
3	Bus bars shall be of electric grade aluminum of size 25 x 10 mm with half round for 3 phases and neutral.
4	Earth flat 25 x 6 mm GI Flat.
5	Components inside box shall be on CRCA MS strips of 2 mm thickness
6	Single phase 150 A MCCB's for 100 KVA DTR distribution box - 3 Nos
7	Cable termination for incoming and outgoing cables: Bottom plates of the size 125mm x 125mm x 3mm width and side for cable tie flat for cable dressing.
8	Lugs of adequate size for both incoming and outgoing sides
9	Name plate with stainless steel thickness 1 mm- 1 No
10	No of Clamps of required size for fixing to the single pole structure – 2 Nos.
11	Size of galvanized earthing nut bolts : M12 X 50 mm size -2 Nos
12	Suitable corp and wood shall be provided for fitting of the cables inside the box.
13	Double door for out door operation duly following IP protection.