

TECHNICAL SPECIFICATION I.R.O.

63,100,160 & 315 KVA

L.T. Distribution Box

1. SCOPE:

This 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. SERVICE CONDITIONS:

The equipment to be supplied against this specification shall be suitable for satisfactory continuous operation under the tropical conditions as specified by employer which is as hereunder;

2.1 Maximum ambient temperature (Degree C) -- 55°C

2.2 Maximum temperature in shade (Degree C) -- 50°C

2.3 Minimum Temperature (Degree C) -- 10°C

2.4 Relative Humidity (percent) --98%

2.5 Maximum Annual rain fall (mm) -- 2500mm

2.6 Maximum wind pressure (kg/sq.m) -- 150kg/sqm.

2.7 Maximum altitude above mean sea level (Meter) -- 3000 mtr.

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	63 KVA	100 KVA	160 KVA	315 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	84 A	134 A	214 A	500 A
6.	No. of Outgoing circuits	2 nos		4 nos	

4 Applicable Standards:

IS :13947/ (Part 3) (amended upto date) for Isolator (Switch Disconnecter)

IS: 8623 (amended upto date) for enclosure Box & for degree of protection provided by enclosures of electrical equipments.

IS: 4237, IS:8623 (amended upto date) – for general requirement of L.T. switchgears.

IS: 5 /2007 - Colours of Ready Mixed paints and Enamels.

IS: 13871/1993 (amended upto date) – Powder coatings – specifications

IS : 6005/1998 (amended upto date) – Code of Practice for phosphating of iron and steel.

IS 2147 – Degree of Protection

IS 2551 – 1982 – Danger Notice Board

IS 13703 (Part 1&2) – 1993 – Specification for LV voltages not exceeding 1000 V AC

IS: 13411/1992 (amended upto date) – Glass Reinforced Polyester Dough Moulding Compounds

5. MANUFACTURE/CONSTRUCTION OF BOXES:

Distribution Boxes shall have Isolator (Switch Disconnecter) on incoming circuit and Porcelain CUTOUT fuse base disconnecter on outgoing circuits with necessary interconnecting Bus Bars.

Standard General Arrangement of Isolators, Porcelain CUTOUT fuse both incoming & outgoing respectively, Bus Bars, Cable termination arrangement etc inside the Box is shown in the enclosed drawings.

6. INCOMING CIRCUIT –

6.1 Isolator (Switch Disconnecter) -

Each distribution box shall have one triple pole Isolator (Switch Disconnecter), conforming to relevant latest IS. The supplier shall indicate makes and types of offered isolator in GTP. The supplier shall submit Type Test Report of the Isolator for approval of Employer before commencement of supply. The Switch disconnecter to be provided in the Distribution Box will be as per Employer specification.

The Isolator should be front operated triple pole type. The casing of Isolator shall be of non-tracking, heat resistant insulating material of Dough Moulding Compound (DMC) of D3 Grade as per IS:13411 (amended upto date), no separate enclosure is required. Isolator Base should withstand the breaking capacity of 80 kA. To extinguish the arc immediately in isolators, in each phase arc-chutes with minimum 12 strips shall be provided.

The isolator should be front operated triple pole type. The isolator shall be robust in construction and easy for operation. The handle of the isolator should be detachable easily for security purpose while working on L.T. circuits.

The characteristics of Isolator shall be as follows:

S.N.	Characteristics	Rating			
		63 KVA	100 KVA	160 KVA	315 KVA
1.	Basic uninterrupted duty	200 A		600A	
2.	Mechanism	Manual quick make quick break			
3.	Standard applicable	IS : 13947 amended upto date			
4.	Utilization category	AC –23 A			
5.	Mechanical Endurance	As per IS 13947 amended upto date			
6.	Electrical Endurance	As per IS: 13947 amended upto date			
7.	Rated Duty	Uninterrupted			
8	Making /Breaking capacity	Not less than requirement of AC –23 A category			
9.	Two seconds rating	4 KA		8 KA	
10.	Rated insulation voltage	660 V			

The terminal connector strips of the isolator shall be projecting out of isolator of 80 mm (minimum) in length on cable connection side as shown in the drawings. In 63 / 100 / 160 / 315 KVA distribution box, the cross section of the strips on outside of the isolator shall be provided as below:

63 / 100 KVA -	25X5 mm.
160 KVA-	50X 6 mm
315 KVA-	50X 6 mm

The material of isolator strips shall be EC grade tin-plated copper. The terminal strips shall be continuous from the point of contact separation inside the Isolator with cross section as mentioned above throughout the length. Gap of 50mm shall be maintained between each terminal throughout the length.

6.2 OUTGOING CIRCUITS:

(i) PORCELAIN CUTOUT WITH FUSE

Each distribution box shall have 6 nos. of Porcelain CUTOUTs in 63 KVA /100 KVA Box and 12 nos of Porcelain Cutouts in 160 KVA / 315 KVA box to protect outgoing circuits. Porcelain Cutouts shall be of reputed make. The Porcelain Cutouts to be provided in the Distribution Box will be as per Employer approval as given in the detailed purchase order.

The detailed specification for porcelain Cutouts shall be as under.

S.No.	Particulars	Details			
		63 KVA	100 KVA	160 KVA	315 KVA
1.	KVA rating	63 KVA	100 KVA	160 KVA	315 KVA
2.	Rated current	100 A	200 A	300	500 A

The Busbar dropper and Terminal connection strip shall be placed in contact terminal of Porcelain cutout as shown in the drawing.

7. BUSBARS AND CONNECTIONS:

The Incomer feeder should be on right side of the distribution box and all outgoing feeders will be on left side of the distribution box, with phase sequence RYB to be maintained. The phase busbars, incoming droppers and feeder droppers from busbars shall be of EC Grade Aluminium. The phase busbar strips shall be of size 720X50X8 mm for 63 KVA/100 KVA and 1120X50X15 mm for 160 / 315 KVA box. Feeder droppers shall be 50X8 mm for 63/100 KVA and 50X15 for 160/315 KVA box. Incomer dropper of 50 x 8 mm cross section for 63 /100 KVA box and 50X15 for 160 / 315 KVA box be provided. All busbars and droppers shall be properly drilled and de-burred. Each bus bar shall be of one single strip without any joint.

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.

Minimum clearances, wherever shown, shall be as per General Arrangement Drawing enclosed with this specifications. Other clearances shall be as per requirement of IS: 4237 amended upto date.

8. ENCLOSURE:

8.1 The Box & Doors shall be made up of CRCA MS sheet of 2mm thickness.

8.2 The manufacturing process of Box shall be Deep Drawn process.

8.3 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.

8.4 The welding process of distribution boxes shall be done by MIG (Metal Inert Gas) welding and workmanship / finishing should be good enough.

8.5 For Deep Drawn Box: the general clear dimensions of 63 / 100 KVA Distribution Box shall be 1000 x 1000 x 325 (L X H X W)mm. The centre height of distribution box on front side shall be 1000 mm The general clear dimension for 160 / 315 kVA distribution box shall be 1545 x 1050 x 390 (L X H X W) mm. The centre height of the distribution box on front side shall be 1050 mm

8.6 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.

A. 63/100 kVA boxes shall have two doors as shown in the drawing fixed on right & left side of the box with four hinges provided from inside of box. On closing of doors, right door shall rest on the left door. Hinges shall not be visible and approachable after closing the box.

- B. 160/315 kVA boxes shall have two doors as shown in drawing fixed on right side & left side of the box with four hinges on both sides shall be provided from inside of box. On closing of doors, right door shall rest on the left door. Hinges shall not be visible and approachable after closing the 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 (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.

8.7. 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.

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

8.9. Locking Arrangement to the Box:

The doors shall be closed with a push fit locking arrangement such that on pressing/pushing the right door, the distribution box gets locked from inside from top & bottom. This arrangement shall be operational for opening of the door with a handle provided outside the door. Handle shall be removable type only. A Nylon washer shall be provided between the handle and door to avoid penetration of water. One central lock with brass levers shall be provided inside the door. Key way shall be provided on the door for operating the central lock from outside. Key way shall be provided with cover.

8.10. A suitable cable termination arrangement with support insulators shall be provided on Isolators. The bimetallic lugs of adequate size, as per enclosed specification & drawing, shall be provided. Clearances, Creepages and convenience in making connections shall be ensured.

8.11 EC grade Aluminium Neutral Busbar of 363 x 25 x 8 mm for 63/100 KVA box and 1200 x 40 x 15mm for 160 / 315 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.

8.12. Bolts of M10 mm and 35 mm length with 2 Nos. plain washer and two Nos. nut are to be provided on both the sides for earthing of the distribution box. Earthing bolt is to be fixed on U-structure (Earth Clamp) welded on both sides of the distribution box. Thickness of earth clamp shall be 2mm. The top surface of the earth clamp shall be properly Zinc plated. Earthing nut bolt and washer should be zinc plated. There should be no powder coating on top surface of the earthing clamps.

8.13 Three bottom plates for 63/100 KVA and 5 bottom Plates for 160 / 315 KVA shall be provided for incoming and outgoing cables as shown in the drawing. Bottom plate of 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 as shown in drawing.

8.14. Necessary fixing arrangement shall be provided at the back of the enclosure to ensure proper fixing on double pole structure by means of suitable clamps at 4 places.

8.15. Danger marking shall be provided in red colour on the right door of the distribution box. Marking shall be scratch proof and properly readable.

8.16 All the components inside the Box shall be mounted on CRCA MS strips of 2mm 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.

8.17. 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.

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

8.19 Name plate having details such as Month & year of manufacturing, , Sr.No, and rating of Distribution box, XXXXX"Name of Employer" shall be riveted on the Distribution box door. Name of Manufacturer shall be duly embossed on the door of the distribution box. The name plate should be of stainless steel of thickness 1 mm.

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

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

8.22 Good-quality plastic sticker leaflet should be pasted inside of distribution box door. The matter of instruction leaflet shall be provided by the employer. All the instructions in leaflet should be in Hindi/English/Local language.

9. CABLE TERMINATION:

Adequate size of Bimetallic lugs shall be provided for 4 (four) core, LT XLPE cable on incoming side and out going side for 63/100 KVA boxes and for 1 (single) core, LT XLPE cable on incoming side and 4 (four) core, LT XLPE cable on out going side for 160/315 KVA boxes as below :

KVA RATING	Incoming side	Outgoing Side
63 KVA	1 x 4 C X 70 sq.mm	1X 4C X 50/70 sq.mm
100 KVA	1 x 4 C X 150 sq.mm	1 X 4C X 50/70 sq.mm
160 KVA	4 x 1C X 630 sq.mm	1 X 4C X 150 sq.mm.
315 KVA	4 X 1C X 630 sq.mm	1 X 4C X 150 sq.mm.

10. LUG : Bimetallic lug should be made for electrolytic grade aluminum. Each lug should be copper coated by electrolytic process and rich layer of tin should be mounted through out the lug to protect from Galvanic Corrosion. The lugs shall be such that the rich layer of tin should not peel off during operation. Individual lot should be pre filled with conductive inhibition compound and lug should be duly capped to prevent oozing of compound. The ductility of material should be such that flow ability of material be adequate to flow in to the strand of the conductor and withstand on crimping pressure of 8500 PSI. The cut cross section of the joints shall be homogeneous.

11. FINISHING OF DISTRIBUTION BOX:

The outer side & 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 Admiralty gray (as per employer requirement) for 63, 100, 160 and 315 KVA box as per IS: 5/2007 (Colours of Ready Mixed paints and Enamels) shall be applied inside & outside surface of the box or as per state practice. Powder coating shall be suitable for outdoor use, conforming IS: 13871 (amended upto date) – Powder coatings. The process facility shall be in-house to ensure proper quality for outdoor application.

12. TESTS & TEST CERTIFICATES:

12.1. 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.

a) Routine Test (Carried out on all boxes): Overall Dimensions Checking. Insulation Resistance Tests.

- High Voltage Test at 2500 V, 50 Hz AC for one minute.
- Operation Test on Isolators.

b) 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:

- 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 Isolator / Porcelain cutouts 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.

c) TYPE TESTS :

i. ON COMPLETE BOX:

- a. Temperature rise test:- The temperature rise test should be carried out as per IS: 8623.
- b. High voltage test shall be carried out as per IS:8623 amended upto date.
- c. Short Time Withstand Current Test on Distribution Box shall be carried out as per IS 8623 or latest version.
The Distribution Box should be subjected to Short Time Withstand Current Test for 4KA for 2 seconds for 63/100 KVA Box and 8 KA for 2 second for 200/315 KVA box all the circuits independently.
- d. Degree of protection for **IP- 33** on complete box shall be carried out as per IS: 13947/1993 or the latest version thereof.

ii. ON ISOLATOR (SWITCH DISCONNECTOR):

All type tests on Isolator (Switch Disconnecter) as per IS: 13947 (Part III) amended up to date shall be carried out.

12.2 TYPE - TEST CERTIFICATES:

The Distribution Box, Isolator (Switch Disconnecter) and Porcelain cutouts offered shall be fully type tested as per relevant IS and this specification. The Supplier shall furnish detailed type test reports before commencement of supply. The detailed Type Test Reports shall be furnished with relevant oscillogram and certified Drawings of the equipment tested. 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 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, Isolator & Porcelain cutout meet the requirements of the specification. The Manufacturer 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 Supplier should furnish the particulars giving specific required details of Distribution Boxes, Porcelain cutouts & Isolator.

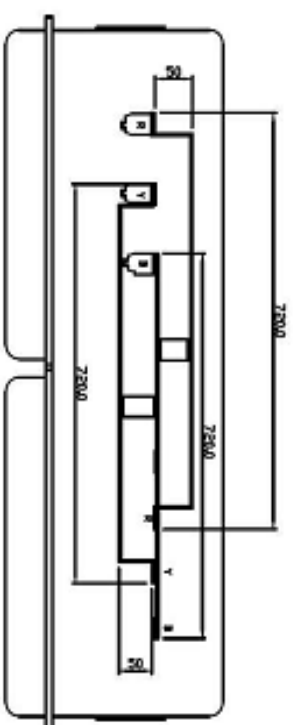
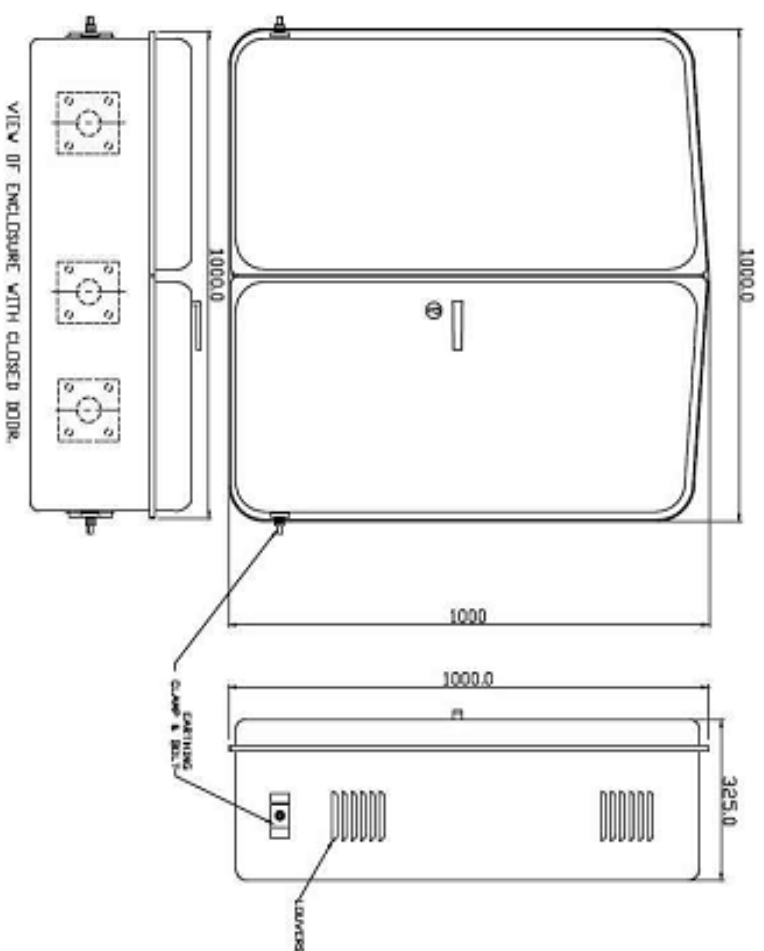
13. TESTING & MANUFACTURING FACILITIES :

Supplier must be an indigenous manufacturer. The Supplier 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 Employer's Engineers, if deputed to carry out or witness the tests in the manufacturer's works. The supplier must have all the in-house testing facilities to carry out the acceptance tests on the Box.

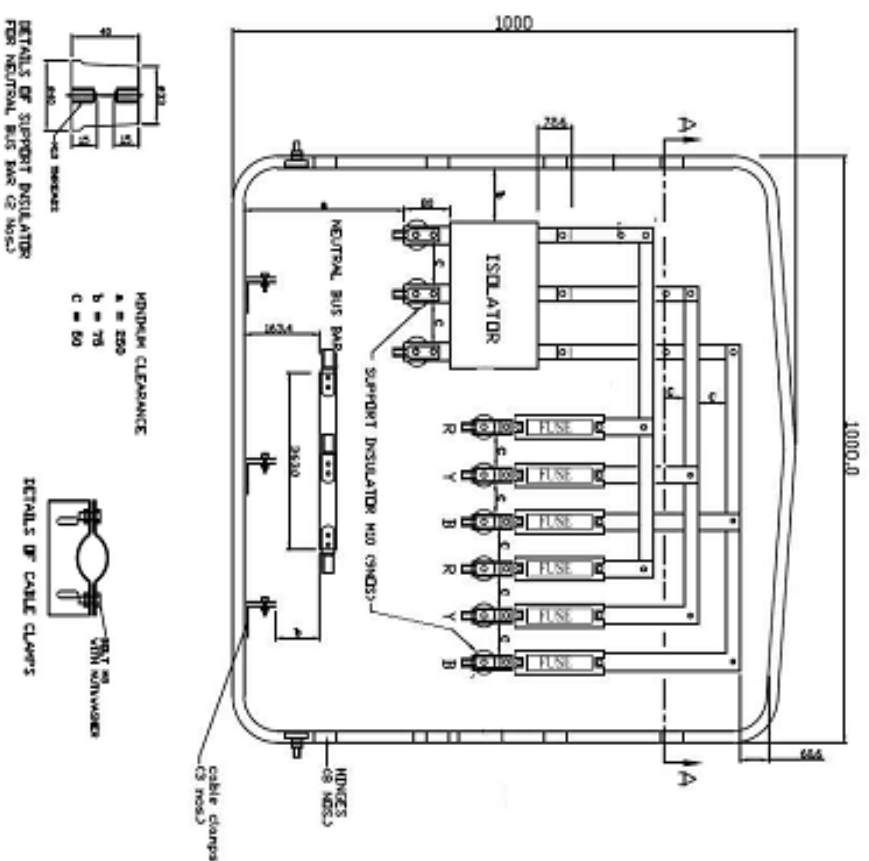
The supplier shall furnish detailed process of manufacturing & Powder coating.

STANDARD TECHNICAL PARTICULARS FOR LT DISTRIBUTION BOX

SL. NO.	Description	For 63 kva	For 100 kva	For 160 kva	For 315 kva
1	Name of Manufacturer	To be Provided by bidder			
2	Name of Purchaser	WBSEDCL			
3	Month & year of Manufacturing	To be Provided by bidder			
4	Sl. No. & Rating of Distribution Box	To be Provided by bidder			
5	System Voltage	433 Volts, 3 Phase (3X250V)			
6	System frequency	50 Hertz			
7	Phase	Three phase with solidly grounded Neutral			
8	Approximate Full Load Current	84 A	134 A	214 A	500 A
9	Incoming Isolator				
A	Basic uninterrupted Duty	200 A	200 A	600 A	600 A
B	Utilisation Category	AC – 23 A			
C	Rated Duty	Uninterrupted			
D	Making & Breaking Capacity	Not less than requirement of AC – 23 A category			
E	Two Seconds Tripping Rating	4 A	4 A	8 A	8 A
F	Rated Insulation Voltage	660 V			
10	No. of Outgoing circuits	Two	Two	Four	Four
11	Busbar materials	One single strip without joint of EC Grade Aluminium			
12	Phase Busbar size	720 X 50 X 8		1120 X 50 X 15	
	Neutral Busbar size	363 X 25 X 8		1200 X 40 X 15	
13	Busbar Insulation	Durable PVC insulation Sleeve with standard colour code for different phase			
14	Porcelain CUTOUT Makes	To be Provided by bidder			
15	Enclosure Materials	The box & diir shall be made of CRCA MS sheet of 2 mm thickness. The manufacture process will be “Deep Drawn”. The moulding on corner and slope on Top is to be provided. Welding process should be done by MIG.			
16	Enclosure Dimension (LXHXW)	1000 X 1000 X 325		1545 X 1050 X 390	
17	No. of Doors	Two doors with four hinges (from inside) from both side of the box			
18	Degree of Protection	IP 33 as per IS 8623 / latest amendment			
19	Locking arrangement	To be provided inside the door			
20	Louvers	Four sets Louvers as per drawing			



SECTION 'A-A' WITH BUS BAR ASSEMBLY DETAILS.



L.T. DISTRIBUTION BOX FOR 100 & 63 KVA DTR W. B. S. E. D. C. L.

