

MATERIAL SPECIFICATIONS CELL

TECHNICAL SPECIFICATION

AC DISTRIBUTION BOARD 'B' TYPE FOR 33 KV SUBSTATIONS

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1.00 SCOPE

This specification covers the design, manufacturing, testing at works and supply of Indoor type A.C. Distribution Boards 'B' type for power supply to yard lighting, Battery charger, 33 kV substation equipments, compressors etc. The system shall be AC 3 Phase, 4 Wire, 433 Volts, 50 HZ with effectively grounded neutral.

2.00 SERVICE CONDITIONS:

The feeder pillar to be supplied against this specification shall be suitable for satisfactory continuous operation under the following environmental conditions:

- a) Maximum ambient temperature 55°C
- b) Maximum ambient temperature in shade 45°C
- c) Minimum temperature of air in shade 35°C
- d) Maximum daily average temperature 40°C
- e) Maximum yearly weighted average temperature 32°C
- 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 meter
- 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.

3.00 STANDARDS :

IS: 13947	Degree of protection provided for enclosure for low voltage control gear and switchgear &MCCB
IS5	Painting
IS: 13947/1993 Part-III amended up to date	Switch Fuse Disconnecter unit
IS 16227 amended up to date	CTs
IS 8828/1996 amended upto date	MCB
IS1248	Indicating instruments
IS 375	Wiring
IS: 13703/1993 Part-I & II	HRC Fuses

4.00 GENERAL TECHNICAL PARAMETERS:

- 4.1 These A C Distribution Boards ' B' type shall be supplied as per this specification and as per the drawing No. C.E/Testing /MSC-I/ ACDB/01 (Annexure-I) enclosed with this specification.
- 4.2 Rated voltage for the Distribution Board and its constituent items like Switch Fuse Disconnecter unit, MCBs, bus ways etc. shall be 3 phase 4 wire A.C. 433 volts, 50 Hz with solidly grounded neutral. The supply voltage may vary by $\pm 10\%$ of rated voltage. All the equipments used in the Board shall operate satisfactorily at this voltage variation.
- 4.3 General requirements:
 - 4.3.1 Each Distribution Board shall be wall mounted/floor mounted having compact design and made from Sheet metal of 1.6 mm. The Board shall be closed, dust protected, weather proof and shall be made vermin proof with a special type lining e.g. Neoprene gasket, around the edges of the doors. The distribution board shall comply degree of protection IP 33. MCBs shall be operating vertically upward for ON/OFF operation & shall be suitable for providing fork type bus bar. The entire distribution board shall have uniform finish and shall be sturdy.
 - 4.3.2 Each Distribution board shall have 2 compartments namely Instruments compartment and Feeder compartment. These compartments shall have doors as described below:
 - a. For Instrument compartment, one no. door with indicating instruments, indicating lamps, selector switches, name plate mounted on it.
 - b. For feeders compartment, one no. inner door with one opening for handle to operate switch fuse unit and four cutouts for outgoing MCBs. One outer door without cutouts & non breakable transparent sheet shall be provided.
 - 4.3.3 All doors shall be provided with mechanical interlocking arrangements along with keys. The distribution board shall have no door on rear side.
 - 4.3.4 Danger board (Caution Plate) shall be fitted suitably on inner door of the DB. Danger board shall be of 100x100 mm size with details as per MSEDCL standard format.
 - 4.3.5 Detachable gland plates suitable for receiving the cable shall be provided at the bottom side of Distribution board with glands.
 - 4.3.6 The ventilating louvers should be covered on inside by a perforated sheet.
 - 4.3.7 All sheet metal used for DB shall undergo seven tank mechanical/chemical cleaning process & painting shall be done using powder coating process. Colour of the Paint shall be admiral gray as per shade no. 632 of IS 5 on exterior and white from interior sides.

- 4.3.8 Each Distribution Board shall be provided with--
- One no. name plate showing the details such as Manufacturer's name, Sr No, rating etc.
 - One no. danger board scripted in Marathi and English.
 - One no. flush mounted 96x96mm size ammeter with selector switch.
 - One no. flush mounted 96x96mm size voltmeter with selector switch.
 - One no. switch fuse disconnect or unit with 100 Amp rating.
 - 3 nos. LED type phase indication lamps for incoming feeder.
 - 3 nos. single phase L.T. CTs of 10VA and CT ratio 100/5A.
 - 1 no timer with contactor for lighting circuit.
 - 3 Nos. of 32 A TPN MCBs having arrangement for fixing fork type busbar.
 - 3 Nos. of double pole 32 A MCBs & 9Nos. of double pole 16 A MCBs with fork type bus bar arrangement.
 - One No. 3 Pole fork type touch proof bus bar suitable for 3 Nos. 3 Pole MCBs.
 - 3 Nos. 2 pole fork type touch proof bus bar suitable for 4 Nos. of 2 Pole MCBs each.

The accuracy class for all indicating and integrating meters shall be class 1

5.00 MAJOR COMPONENTS:

5.1 Busbar:

Copper Bus bar used in ACDB shall be fork type comb Bus bar (Similar to 'Hager make' fork busbar Cat.ref. KDN463A & KDN263A) of current rating 63/100A (As per the actual requirement) without joints. This bus bar shall be directly mounted on MCBs. Total 4 nos. of busbars are to be provided with following details.

- One No. 4 Pole fork type touch proof busbar to connect 3 Nos. 3 Ph 32A, TPNMCBs.
- Three Nos. Double pole fork type touch proof busbar suitable for 1 No of 32A, DP MCB & 3 Nos. of 16A DP MCBs each.

While providing this bus bar, middle TPN/DP MCB shall be connected to outgoing side of main switch disconnecter

Incoming cable for ACDB shall be terminated on terminal connectors provided at the bottom. Connection between incomer terminals and Switch Fuse Disconnecter unit shall be with 50 sq. mm copper cable. Outgoing of Switch Fuse Disconnecter unit shall be connected with MCBs with 35 square mm copper cable.

For all 32 A rated MCBs, 16sq.mm. stranded cable shall be used. For all 16A rated MCBs, 10 sq.mm. copper cable shall be used. Earthing arrangement shall be as per clause no. 5.5 of this specifications.

5.2 Incoming circuit:

Incoming circuit shall have one no. 3 phase, 433 volt Switch Fuse Disconnecter unit of nominal current rating of 100Amps conforming to IS: 13947/1993 amended up to date and 3 No. LT resin cast CTs having CT ratio of 100/5A with burden 10VA & accuracy class 1. Switch Fuse Disconnecter unit shall be approved by C.E.(Testing)

To receive incoming cable, one no. 4 way bolted type connector of suitable size shall be provided.

Incoming cable for incomer LT XLPE, 3 ½ C, 120 sq. mm shall be provided by MSEDCL.

5.3 Outgoing circuits:

5.3.1 Total 15 Nos. Outgoing circuits shall be provided as per the details given below.

Sr. No.	Sr. No. of the feeder	Feeder rating	Short circuit capacity / Breaking capacity (in KA)	Tinned copper lugs suitable for size of cable.
1	1,2,3 (Total 3 nos.)	TPN 32A MCBs	6 KA at 0.7 P.f. lag	4 core 16sq.mm. LT PVC cable.
2	4,8,12 (Total 3 nos.)	DP 32A MCBs	6 KA at 0.7 P.f. lag	2 core 16 sq.mm. LT PVC cable.
3	5,6,7,9,10,11, 13, 14,15 (Total 9nos.)	DP 16A MCBs	6 KA at 0.7 p.f. lag	2 core 10 sq.mm. LT PVC cable.

MCBs shall comply following specifications as per IS 8828/1996.

- a) Rated voltage & freq. shall be 240V & 50 Hz respectively for DPMCBs.
- b) Rated current shall be 32A/16 A as mentioned above.
- c) Rated short circuit capacity shall be min. 6 KA at 0.7 p.f. lag
- d) Service short circuit capacity shall be 6KA as per table 15 of IS: 8828/1996.
- e) MCBs shall have fixed un adjustable time / current characteristics.
- f) Under voltage release and shunt-trip release coils are not required. Only overload release and short circuit release shall be provided.
- g) Tripping time shall be as per (clause No. 8.6.1) table 6 of IS: 8828/1996.
- h) MCBs shall be capable of carrying out given no. of operation cycles as per clause No. 9.11 of IS: 8828 /1996.
- i) Limits of temperature rise shall be as per (clause No. 9.8) table 5 of IS: 8828/1996.
- j) Standard range of instantaneous tripping shall be type 'B' as per (clause No.5.3.5) table 2 of IS: 8828/1996.

MCB shall be suitable for mounting of fork type busbar of suitable size. MCBs shall be type tested & of approved make approved by C.E. (Testing & QC)

- 5.3.2 All MCB outgoing terminals shall be terminated on terminal connectors provided at the bottom with suitable size of cable.
- 5.3.3 The enclosure shall be provided with proper earthing arrangement. Earthing arrangement shall consist of 2 G.I. Bolts of 12 mm (min.) with 2 spring/ plain washers and 2 check nuts.
- 5.3.4 PVC cable glands of adequate size shall be provided for all incoming and outgoing cables.

5.4 Indicating Instruments:

Principal requirements of indicating instruments are as follows:

5.4.1 Ammeter:

Ammeter shall comply the following requirements

Class of accuracy	1
Range	0-100 Amps
Mounting	Flush type
Size	96 x 96mm
Type	Panel Mounting with 3 ½ Digital Display
Operating Current	5A from CT Secondary

Ammeter shall be guaranteed for free replacement for any defects within five years from the date of supply.

5.4.2 Ammeter selector switch:

Ammeter Selector switch shall be a four-position rotary type with R, Y, B and 'OFF' positions marked clearly on 48 x 48 mm brushed aluminum plate with black handle. The Switch should be screw mounting type with finger touch proof terminals. Terminal wire should be inserted from the side of the switch terminal. Terminal screw must be captive to avoid misplace during maintenance. The switch shall be of 12 A rating with insulation level of 1100V.

5.4.3 Volt Meter:

Voltmeter shall comply the following requirements

Class of accuracy	1
Mounting	Flush type
Size	96x 96 mm
Range	0-600 volts
Type	Panel Mounting with 3 ½ Digital Display

Voltmeter shall be guaranteed for free replacement for any defects within five years from the date of supply.

5.4.4 Volt Meter selectors witch:

Voltmeter Selector switch shall be a seven-position rotary type (6 way & off) with 3 phase to phase & 3 phase to neutral position marked clearly on 48 x 48 mm brushed aluminium plate with black handle. The Switch should be screw mounting type with finger touch proof terminals. Terminal wire should be inserted from the side of the switch terminal. Terminal screw must be captive to avoid misplace during maintenance. The switch shall be of 12 A rating with insulation level of 1100V.

5.4.5 Indicating Lamps:

Indicating lamps shall be panel mounting type 22.5 mm with rear terminal connections having LEDs display. Lamps shall have translucent lamp covers to diffuse lights, coloured red, yellow, green or blue as specified. The lamp cover shall be preferably of screw-on type, unbreakable and molded from heat resisting material.

All indications shall be bright LEDs having long life. Conventional bulbs are not acceptable.

5.4.6 Yard lighting Control Timer:

One no. universal time switch with quartz clock of following specification shall be provided for lighting circuit. Operating voltage 240 V AC with contact rating of 16 A Timer with built in contactor having 3 nos. of NO contacts for yard lighting shall be preferred. In case the same is not available, separate timer & contactor can be used. Mounting arrangement shall be DIN rail type.

1 No. 3 pole 2 Amp MCB shall be provided for protection circuit of voltmeter & indicating lamps

5.4.7 Earthing Arrangements:

Two nos. Earthing studs of galvanized M.S. 25 X 6 mm shall be provided for external earth connections at the bottom. These should be complete with plain washer, spring washer, nuts etc. Earthing Bolts must be welded to prevent removal of the same from the cabinet.

6.00 TYPE TEST CERTIFICATES:

MCBs & other components used in ACDB shall be fully type tested as per relevant IS and this specification. The successful Bidder 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 which are accredited by the National Board of Testing and Calibration Laboratories (NABL) of Government of India such as CPRI Bangalore/ Bhopal, ERDA Baroda, to prove that the MCBs & other components used in ACDB meet 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 tests reports conducted in manufacturers own laboratory and certified by testing institute shall not be acceptable.

7.00 DRAWINGS:

The successful bidder have to supply the complete material as per overall General Arrangement drawing No. Successful bidder shall submit the detailed drawings along with component details/makes etc. for necessary approval.

8.00 INSPECTION:

All tests and inspection shall be made at the place of manufacturer. The manufacturer shall provide reasonable testing and inspection facilities and co-operation without any charge to satisfy him that the material is being supplied is in accordance with this specification. The proto of ACDB shall be inspected & checked by C.E. (Testing) or his representative for approval before commencement of supply.

necessary approval.

9.00 SCHEDULES:

The tenderer shall fill in the following schedules, which form part of the tender specification and order.

Schedule 'A'- Guaranteed Technical Particulars.

SCHEDULE 'A'

GUARANTEED TECHNICAL PARTICULARS OF ACDB 'B' TYPE

Sr.No	Parameter Name	Parameter type
1	Enclosure fabricated from M.S. Sheet of 1.6 mm thickness (Y/N)	Boolean
2	All sheet metal work has undergone 7 tank chemical processing and powder coating (Y/N)	Boolean
3	Colour of enclosure from inside is white (Y/N)	Boolean
4	Colour of enclosure from outside is admiral grey as per our specification. (Y/N)	Boolean
5	Overall Dimensions are as per specified drawing (Y/N)	Boolean
6	Fork type comb bus bar is of electrolytic tinned copper of size 10/16 Sq. mm with 63/100A rating & without joints as per specification (Y/N)	Boolean
7	Switch Fuse Disconnecter unit for incomer is of 3 Ph, 440 Volts, 100A rating (Y/N)	Boolean
8	Make & Type of Switch Fuse Disconnecter Unit	Text
9	Resin Cast LT CTs are of ratio 100/5 with burden 10 VA & accuracy class 1. (Y/N)	Boolean
10	Make of CTs	Text
11	No. of 3 Ph. 32 A TPN MCBs provided	Numeric
12	Make & Type of 3 Ph. 32 A TPN MCBs	Text
13	No. of 1 Ph. 32 A DP MCBs provided	Numeric
14	Make & Type of 1 Ph. 32 A DP MCBs	Text
15	No. of 1 Ph. 16 A DP MCBs provided	Numeric
16	Make & Type of 1 Ph. 16 A DP MCBs	Text
17	All MCBs are type tested & having short circuit rating of Min. 6 KA at 0.7 pf lag (Y/N)	Boolean
18	Ammeter is having range of 0-100A with Auxiliary Current rating of 100/5A & Accuracy Class 1. (Y/N)	Boolean
19	Make & Type of Ammeter (Analog/Digital)	Text
20	Voltmeter is having range of 0-500V & Accuracy Class 1. (Y/N)	Boolean
21	Make & Type of Voltmeter (Digital)	Text
22	Make, Type & Rating of Ammeter Selector Switch	Text

TECHNICAL SPECIFICATIONS OF AC DISTRIBUTION BOARD 'B' TYPE FOR 33 KV SUBSTATIONS

Sr.No	Parameter Name	Parameter type
23	Make, Type & Rating of Voltmeter Selector Switch	Text
24	Make & Type of Yard lighting timer control switch	Text
25	Time setting slots available in Yard lighting timer control switch	Text
26	Yard lighting controller timer switch provided with inbuilt contactor	Text
27	Indicating lamps are of LED type with 22.5 mm dia.	Text
28	Din/rail mounted terminal connectors as per requirement provided (Y/N)	Boolean
29	Wiring between MCBs and terminal connectors is with specified stranded copper wire as per specifications	Boolean
30	Terminal connectors are of Bolted type provided as per specification and drawing (Y/N)	Boolean
31	Detachable gland plate is provided with knockout type arrangement for providing cable glands at the bottom (Y/N)	Boolean
32	Cable glands as per requirements provided separately (Y/N)	Boolean

**ANNEXURE-I
DRAWING**

