

**TECHNICAL SPECIFICATION FOR L.T. MOULDED CASE CIRCUIT
BREAKER SUITABLE FOR PROTECTION OF DISTRIBUTION
TRANSFORMERS UPTO 400 KVA CAPACITY ALONGWITH WIRING &
ENCLOSURES.**

1. SCOPE:

- 1.1 This specification covers the design, manufacture, assembly inspection and testing before dispatch/installation packing & delivery F.O.R. designation of MCCB of thermal magnetic type with Auxiliary switch with all other accessories & supporting structure required for satisfactory operation.

2. STANDARDS:

The Molded case Circuit Breaker should conform to the latest edition and amendment available at the time of supply of material.

Sl. No.	Standard Ref. No.	Title
1.	ISS-13947-2	Accuracy of Molded Case Circuit Breaker.
2.	IEC-947	Specification for protection/Safety of MCCB.

- 2.1 Equipment meeting with the requirement of other authoritative standards whichever equal or better quality than the standards mentioned above, shall also be acceptable, the equipment offered by the bidder, conform to other standards, salient points of reference between the standards adopted and the specified standards shall be clearly brought out in the offer. Four copies of reference standards in English language shall be furnished along with the offer.

3. CLIMATIC CONDITION:

- 3.1 The equipment are required to operate satisfactory under the following conditions:-

i.	Maximum temperature	50° C
ii	Maximum temperature	- 2.5° C
iii	Relative humidity	
(a)	Maximum	100%
(b)	Minimum	26%
iv	Isoceraunic level	45
v	Number of rainy days per year	Nearly 120 days
vi	Average rainfall per annum	900 mm
vii	Average number of dust storms days per annum.	35
viii	Altitude	1000 meters above means sea level
ix	Maximum temperature in the shade.	45° C
x	Maximum wind pressure.	195 Kg./Sq. meter

4. PRINCIPAL PARAMETERS:

Sl. No.	Particulars	T/f Capacity (In KVA)		
		100	250	400
1.	Rated operating current frame size Amp (Min.)	200 A	400 A	600 A
2.	Fixed overload release setting (Amp.)	140 A	335 A	535 A
3.	Power loss & Milivolt drop	9.37 W 60	9.37 W 60	12 W 72

		mv	mv	mv
4.	Rated Voltage (Volts)	415 V	415 V	415 V
5.	Rated Insulation level	660 V	660 V	660 V
6.	Number of poles	Three	Three	Three
7.	Rated Ultimate breaking capacity Icu (KA)	10 KA (Min)	10 KA (Min)	16 KA (Min)
8.	Rated service breaking capacity ICS (KA) (75% of ultimate breaking capacity, Icu.)	Not less than 75% of Icu at 0.4 PF (Min)		
9.	Power Factor for short circuit (Max)	0.4 (Lag)	0.4 (Lag)	0.4 (Lag)
10.	Frequency	50 Hz \pm 3%	50 Hz \pm 3%	50 Hz \pm 3%
11.	Impulse withstand voltage	6 KV	6 KV	6 KV
12.	High voltage withstands voltage.	3 KV for one minute	3 KV for one minute	3 KV for one minute

5.1 GENERAL TECHNICAL REQUIREMENTS:

- 5.1.1 The molded case circuit breaker should be provided with auxiliary switch having ON/OFF indication.
- 5.1.2 Material used in construction of circuit breaker shall be capable of withstanding the degree of protection & thermal stress without distortion or failure of any part.
- 5.1.3 The MCCB shall be supplied complete in all respect with necessary tools, bolts and other accessories considered necessary by tenderers for satisfactory operation.
- 5.1.4 The MCCB shall be completely maintenance free.
- 5.1.5 All equipment accessories and wiring shall have tropical protection, involving special treatment of metal and insulation against fungus, insects and corrosion.
- 5.1.6 The safety clearance of all live parts of the equipments shall be as per relevant standards.
- 5.1.7 MCCB should be provided with thermal magnetic type for the protection of the T/F against over loading.
- 5.1.8 Rated operating current, frame size should be as per Sr. No. 1 of Table-4.
- 5.1.9 The MCCB should be provided with disconnection functions with positive isolation features.
- 5.1.10 The MCCB should be provided push to trip features also.

5.2 OPERATING MECHANISM:

- 5.2.1 The MCCB shall have an auxiliary switch with on and off indication.
- 5.2.2 Thermal magnetic type, quick break, quick make (trip free) mechanism should be provided in the MCCB.

5.3 DESIGN AND OPERATING PRINCIPLE:

The design & operating principle of moulded case circuit breaker should be of current limiting design with fast operating time and low thermal stress with compact size and independent manual operation.

- 5.4 Moulded case circuit breaker should have the provision like position of switch different from ON & OFF state to indicate the tripping of MCCB.

5.5 TIME/CURRENT CHARACTERISTICS:

The MCCB shall not cause any tripping due to switching current of inductive & capacitive loads.

5.5.1 The MCCB shall have the following time/current characteristics:

Sl. No.	Multiple of normal current setting	Tripping time
1.	1.05	More than 2.5 Hrs.
2.	1.20	More than 10 Minutes and less than 2.0 Hrs.
3.	1.30	Less than 30 Minutes
4.	1.40	Less than 10 Minutes
5.	2.50	Less than 1 Minutes
6.	4.00	Not less than 2 Minutes
7.	6.00	Less than 5 Seconds.
8.	12.00	Less than 40 mili seconds.

5.5.2 For the time/current characteristic, the reference calibration temperature of the breaker shall be 50 °C duration, if any up to 60 °C operating temperature shall not exceed 10% of the current setting indicated in Para 5.5.1.

5.6 TEMPERATURE RISE LIMIT:

The temperature rise on any part of equipment shall not exceed the maximum temperature rise limit specified in relevant ISS over an ambient temperature of 50 °C.

5.7 ERECTION TOOLS:

Special tools and standard accessories required for assembly and for maintenance on the MCCB should also form a part of the supply. Necessary list should be supplied with the tender.

5.8 CONNECTION OF MCCB:

5.8.1 Copper strip should be provided for connection at MCCB.

5.8.2 The copper strip shall be fixed at the incoming and outgoing of MCCB having the following para meters:-

A. Size of Strip:

Sl. No.	Description	Transformer Capacity		
		250 KVA	400 KVA	100 KVA
1.	For phase & neutral (3 Nos.)	135 mm ²	200 mm ²	50 mm ²
2.	For Neutral (1 No.)	100 mm ²	150 mm ²	35 mm ²

The copper strip shall be fixed on LT insulators. Provision to fix two cables through lugs at the outgoing side of strips shall be made for connecting outgoing cables. Also proper phase to phase and phase to earth clearance shall be maintained. The complete MCCB and BUS BAR system shall be inside the LT M.S. box.

5.8.3 Bakelite sheet should be used in the moulded case circuit breakers make Hyalm, Super Hualm, miliborn or any reputed make. The MCCB should be fixed in side the metal box on the bakelite sheet. The bakelite sheet should be provided, for the MCCB, in L.T. Box having the following parameters:-

Sl. No.	T/f Capacity	Minimum Thickness
1.	250 KVA	5 mm
2.	400 KVA	5 mm
3.	100 KVA	5 mm

5.9 M.S. BOX:

M.S. Box (as per design attached) on the L.T. side of the T/f should be provided for covering the LT connection. The clearance between the phases, phase to neutral should to be maintained as per ISS. M.S. sheet should be of minimum thickness of 2.00 mm.

The following points should also be kept in view while manufacturing the M.S. Box:-

- i Two no. Rain proof air ventilators should be provided on the opposite sides.
- ii Window with window sheet should be provided for ON/OFF indication of the MCCB.
- iii Suitable rubber glands for 3 No. phase cables & one No. neutral cable should be provided.
- iv It should be ensured the opening cover of the box of the MCCB should be fully welded with the box at the time of dispatch.
- v One no. danger plate (with marked "DANGER" in red colour & Human Skull) easily visible should be provided on the box.
- vi It should be painted with colour shade no. 632 both inside & outside with powder coating.

5.10 INDICATORS:-

The MCCB shall have a set of auxiliary contacts built in for indicating the healthiness of phases i.e. R, Y & B. These normally open contacts shall form part of the signal light circuit. The signal light circuit shall consist of any auxiliary T/F capable of delivering 4 volt on the secondary side.

5.11 RATING PLATE:

MCCB shall be provided with a rating plate marked with but not limited to following data:-

- i. Manufacturer's name, type of MCCB.
- ii. Serial number.
- iii. Rate Voltage.
- iv. Rated normal continuous current.
- v. Rated insulation level.
- vi. Rated frequency.
- vii. Rated short time breaking current with rated duration.
- viii. Total weight of breaker.

6.0 TESTS:

6.1 TYPE TESTES:

The equipment offered should be fully type tested as per relevant standards. In case the equipment of the type and design, offered, has already been type tested (not later than five years) the Bidder shall furnish for sets of the type test reports also with the offer. The purchaser reserves the right to demand repetition of the same all type tests in the presence of Purchaser's representative. For this purpose Bidder may quote unit rates for carrying out each type tests. For any change in the design/type already type tested viz-a-viz the design/type offered against the specification the purchaser reserves the right to demand the repetition of the same without any extra cost. In case the equipment has not been type tested earlier, the type tests as per relevant standard shall be carried out by the successful Bidder in the presence of purchaser representative.

6.2 ACCEPTANCE AND ROUTINE TESTS:

- 6.2.1 All acceptance and routine tests as per relevant ISS shall be carried out by the bidder in the presence of Purchaser representative.

6.2.2 ADDITIONAL TEST:

The purchaser reserves the right to carry out any other type tests of a reasonable nature at the works of the manufacturer/laboratory.

6.2.3 The purchaser reserves the right to insist for witnessing the acceptance routine testing of the bought out items.

6.2.4 No material shall be despatched by manufacture unless the material has been satisfactorily inspected tested and further despatch authorized by purchaser.

7.0 LIST OF DRAWINGS AND DOCUMENTS:

The bidder shall furnish four sets of relevant descriptive and illustrative published literature pamphlets and the following drawings for preliminary study alongwith the offer.

- a) General outline drawings showing dimensions and shipping weights, quantity of insulating media etc.
- b) Sectional views showing the general constructional features of the circuit breaker including operating mechanism, arcing chambers, contacts with lifting dimensions for maintenance etc.
- c) Schematic diagrams of MCCB offered for control supervision and reclosing.

9.0 PACKING AND FORWARDING:

The equipment shall be packed in suitable crates so as to withstand handling delivery transit. The bidder shall be responsible for any damage to the equipment during transit, due to improper and inadequate packing and handling. The easily damageable material shall be carefully packed and marked with the appropriate cautions symbols. Wherever, necessary, proper arrangement for lighting such as lifting hooks etc. shall be provided. Any material found short inside the packing cases shall be supplied by the bidder without any extra cost.

Each consignment shall be accompanied by a detailed packing list containing the following information:

- a) Name of consignee.
- b) Details of consignment.
- c) Destination.
- d) Total weight of consignment.
- e) Sign showing upper/lower side of the crate.
- f) Handling and unpacking instructions.
- g) Bill of material indicating contents of each package and spare material.

**GUARANTEED TECHNICAL PARTICULARS OF LT PROTECTION BOX
WITH MCCB FOR 400 KVA DISTRIBUTION TRANSFORMERS.**

Sl. No.	Description	Technical Particulars offered
A	MCCB Specification	
1.	Moulded case Circuit Breaker (MCCB) approved makes.	
2.	Type of MCCB.	
3.	Standards to which confirms to for	
a)	Accuracy	
b)	Protection/safety	
4.	Rated Operating Current, Frame size Amp.	
5.	Rated voltage, volts.	
6.	Rated Insulation Level	
7.	Fixed overload release setting (Amp.)	
8.	Number of Poles	
9.	Rated Ultimate Breaking capacity, Icu (KA) as per IS:13947/1933.	
10.	Rated service breaking capacity Ics (KA) is 75% of Ultimate Breaking capacity, Icu.	
11.	Power factor for short circuit (Max.)	
12.	Utilization Capacity.	
13.	Power loss & mill volt drop values.	
14.	Protection against over load.	
15.	Impulse withstand voltage.	
16.	High voltage withstands voltage.	
17.	Type of mechanism.	
18.	Design & Operating Principle.	
19.	Whether time-current characteristics is as per with temperature rise.	
20.	Whether the MCCB is having disconnecting functions with positive isolation features.	
21.	Whether the MCCB is having flexible mounting with line-load reversibility features i.e. no change in rating and breaking capacity of MCCB when mounted in different orientations and with line and load connections changed.	
22.	Whether the MCCB is having push-to-trip feature.	
23.	Whether the MCCB is having provision like position of switch different from ON & OFF state to indicate tripping of MCCB.	
24.	Weight of the MCCB.	
25.	Whether samples submitted with offer as specified.	
26.	Instructions and operating manual with sample.	
B	CABLE Specification	
27.	Copper cable approved makes	
28.	Copper cable size per phases	
29.	copper cable size of Neutral	
30.	Total copper cable required.	
31.	Copper cable length.	
C	THIMBLE/LUGS Specification.	
32.	Thimble/Lugs approved makes.	
33.	Thimble/Lugs metal to be use.	
34.	Thimble/Lugs size for phases.	
35.	Thimble/Lugs size for Neutral.	

36.	Thimble/Lugs to be use in all cable connection & end of cables.	
37.	Total no. of thimble/lugs to be fitted	
a)	70 mm	
b)	50 mm	
38.	Crimping of thimble/lugs.	
D	BAKELITE SHEET Specification	
39.	Bakelite Sheet approved makes.	
40.	Fixing of MCCB inside of Box.	
41.	Bakelite sheet thickness.	
42.	Bakelite sheet size.	
E	BOX Specification	
43.	Size of box and fixing arrangement with box.	
44.	Box inside look and outside look as per design.	
45.	MS sheet thickness	
46.	Air ventilation provide in box.	
47.	MCCB On/Off switch window to be provided with window shed.	
48.	Box opening cover should fully welded with box at the time of dispatch.	
49.	Danger plate with operating instructions.	
50.	Rubber glands.	
F	LED INDICATORS Specification.	
51.	LED Indicators approved makes.	
52.	Colour & Nos. of indicators to be	
53.	Mounting of Indicators.	