

TECHNICAL SPECIFICATION FOR LT. MCB WITH ENCLOSURE
Spec.No. Dist /MM-I/2006

INDEX

SR.NO.	PARTICULARS	PAGE NO.
1	SCOPE	2
2	APPLICABLE STANDARD	2
3	SERVICE CONDITIONS	2
4	NO.OF POLE	2
5	RATED VOLTAGE	2
6	RATED CURRENT	2
7	RATED SHORT CIRCUIT CAPACITY	3
8	RATED SERVICE SHORT CIRCUIT CAPACITY	3
9	OPERATING CONDITIONS	3
10	DESIGN AND CONSTRUCTION	3-4
11	TERMINALS	4-5
12	ENCLOSURE	5-6
13	EARTHING	6
14	CLEARANCES	6
15	TESTS	7-10
16	INSPECTION	9-10
17	DRAWINGS	10
18	MINIMUM MANUFACTURING FACILITY	10-11
19	MINIMUM TESTING FACILITIES	11-12
20	Schedule	12
	Annexure I	13
	Schedule 'A'	14
	Schedule 'C'	15
	Schedule 'F'	16

TECHNICAL SPECIFICATION FOR L.T.MINIATURE CIRCUIT
BREAKERS (SINGLE POLE)
SPEC NO: Dist /MM-I/2006

1. Scope:-This specification covers manufacture, testing at works and supply of single pole B-type A.C.L.T. Miniature Circuit Breakers suitable for protection of L.T. service lines/meters.

The original manufacturer of MCB shall only quote against this tender and the offer of the original manufacturer of the MCB shall only be considered.

2. Applicable Standard:-Unless otherwise stipulated in this specification, the M.C.Bs. shall comply with the latest version of I.S.8828/1996.

3.0 SERVICE CONDITIONS:

Equipment to be supplied against this specification shall be suitable for satisfactory continuous operation under the following tropical conditions.

- | | | | |
|------|---|-------|-----------|
| 3.1 | Maximum ambient temperature (Degree C) | | 50 |
| 3.2 | Maximum temperature in shade (Degree C)..... | | 45 |
| 3.3 | Minimum temperature of Air in Shade(Degree C).. | | 3.5 |
| 3.4 | Relative Humidity (Percent) | | 10 to 100 |
| 3.5 | Maximum annual rain fall (mm) | | 1450 |
| 3.6 | Maximum wind pressure (Kg/sq.M.) | | 150 |
| 3.7 | Maximum altitude above mean sea level (Metre). | | 1000 |
| 3.8 | Isoceranic level (days per year) | | 50 |
| 3.9 | Siesmic level (Horizontal Acceleration)..... | | 0.3 g |
| 3.10 | Moderately hot and humid tropical climate conducive to rust and fungus growth | ... | |

4) No.of Poles: MCBs required are of single-pole types.

5) Rated Voltage & Frequency:- The rated voltage single pole 240 VOLT & 50 Hz frequency.

6) Rated Current:- The rated currents shall be 10,20,32 and 40 amperes for single-pole units .

- 7) Rated short-Circuit capacity :- All Single pole MCBs shall be suitable for 6 KA as per IS: 8828/1996.
- 8) Service Short Circuit Capacity:- The Service short circuit capacity of MCBs shall be 6 KA as per table 15 of IS:8828/1996. The procedure for making the Short Circuit test and the test circuit etc. shall be in accordance with the IS: 8828/1996.
- 9) Operating Conditions:-
- a) Time-Current Characteristics: The MCBs shall have a fixed, unadjustable time/ current characteristics. The same shall be prepared in accordance with clause No.8.6.1 of IS:8828/1996 and the manufacturer shall submit the copies of these curves with his bid document failing which offer shall stand rejected.
 - b) Under voltage release and shunt-trip release coil are not required in these MCBs. Only overload release and Short Circuit release should be provided. Tripping time of MCBs shall be as per Table 6 of IS:8828/1996 (Clause No.8.6.1). Reference calibration Temp. for this purpose shall be 30 degree centigrade .
 - c) Mechanical & Electrical Endurance: MCBs shall be capable of carrying out a given number of operation cycles as per clause NO:9.11 of IS: 8828/1996.
 - d) Limits of Temperature Rise: Temperature rise of various parts of circuit-breakers measured during the test carried out under the conditions specified in clause No.9.8 of IS:8828/1996 shall not exceed the limiting values stated in Tables 5.
- 10) Design & Constructions of MCB:
- a) Materials shall be suitable for the particular application and capable of passing the appropriate tests. The MCBs shall have trip free operating mechanism.

b) The metallic portions of the mechanisms shall be either inherently resistant to, or so treated as to make them resistant to atmospheric corrosion. The terminal screws used shall be of brass or non-magnetic stainless steel.

c) Marking: Each MCB to be supplied in accordance with this specification shall bear markings as per clause No.6 of IS:8828/1996.

d) The mechanism shall be fitted with an automatic release which shall at all times function independently of the means used to close the circuit breaker.

e) Circuit breakers shall be arranged for manual closing and opening and for automatic tripping on over current/short circuit.

f) The operating mechanism case shall be effectively sealed by the manufacturer to prevent access to the mechanism. The case shall be of insulating material and shall be designed to withstand reasonably rough usage without fracture or permanent distortion.

g) Ventilating Outlets: Ventilating outlets from circuit breakers shall be so situated that a discharge of gases or hot air from arc chambers, when provided in air circuit breaker, will not cause electrical breakdown and shall be directed away from any place where an operator may have to be in the course of his ordinary duties.

The construction shall be such that gas cannot collect at any point where ignition can be caused during or after operation by sparks arising from normal operation of a circuit-breaker or its ancillary equipment.

11.0 Terminals: The MCB shall be with stirrup type terminals as per drawing given in IS:8828/1996 on page 92 and shall be such that live parts are not accessible. Live part cannot be touched by the test finger of design shown in Fig 9 on page no.70 of IS:8828/1996.

The terminals shall be of substantial mechanical construction and shall provide adequate electrical contact for 25 Sq.mm. size of Aluminium / Copper cable to be used.

Terminals shall be such that they cannot turn or be displaced when the connecting screws are tightened and such that the conductor cannot become displaced/loose.

Terminal connectors shall be such that the conductors may be connected perfectly so as to ensure that the necessary contact pressure is maintained permanently on connected cable.

Terminals shall be so mounted that the appropriate wire or cable may be connected without impairing the normal performance of the unit.

No contact pressure shall be transmitted through insulating material and the gripping of the conductor shall take place between metal faces.

The terminals shall be clearly and indelibly marked for those circuit breakers which require distinction between the supply Side and the load side and/or between phases and neutral.

12.0 Enclosure:

12.1 The circuit breaker shall be housed in a separate metallic enclosure. The enclosure shall meet the degree of protection as per IP-40 of Appendix ' C ' of IS:13947 (Part-I) /1993 and shall be capable of being sealed at two points in closed position.

12.2 Enclosure shall be made of CRCA sheet steel of 1.25 mm minimum (18 SWG) thickness and shall be powder coated both inside and outside, the colour shall be light gray .The minimum dimensions shall be: height-140 mm, width-55 mm and depth-60 mm.

The enclosure shall be manufactured from two sheet steel pieces without any welded joints, except the DIN channel for mounting of MCB shall be spot welded.

12.3 Each enclosure shall be embossed with the below stated marking:

1)M.S.E.D.C.L. 2)Trade mark/make of MCB,3)Rated current of MCB.

12.4 The enclosure shall be so arranged that when they are opened the terminals are easily accessible. Sufficient space shall be left in the interior of the enclosure

for accommodation of external conductors from their point of entry into the enclosures upto the terminal

of the MCB. The operating knob/bar of the MCB and ON/OFF marking shall remain outside the enclosure.

- 12.5 The movable parts of the protective enclosures shall be firmly secured to the fixed parts by a device such that they cannot be accidentally loosened or detached owing to the effects of operation of the equipment.
- 12.6 The covers of the enclosures, shall be so secured that it is not possible to open them without the use of tools, unless suitable means are provided to prevent accidental contact with live parts.
- 12.7 Metallic enclosures shall be so arranged as to prevent any accidental contact between these enclosures and live parts when the enclosures are in place. If, for this purpose, the enclosures are partly or completely lined with insulating material. This lining shall be securely fixed to the enclosures.
- 12.8 The entry of the cables shall be from the back side or/and from top and bottom side of the enclosure be made so that surface wiring connection can be made and the design should be such as to make the cables in-accessible once the enclosure is fixed in position. The fixing screws shall be inside the sealed enclosure.

13.0 Earthing:

The assembly comprising of chassis, framework and the fixed parts of the metal casing of the circuit-breakers, where used, shall be provided with a separate earthing terminal & shall be marked. The terminal shall be provided over and above all other means provided for securing metallic enclosures (Armour or other metallic coverings) of current carrying cables.

The earthing terminal shall be of adequate size; be protected against corrosion and shall be metallically clean. Under no circumstances shall a movable metal part of the enclosure be insulated from the part carrying the earthing terminal when the movable part is in place.

The earthing terminal shall be identified by means of the sign marked in a legible and indelible manner on or adjacent to the terminals.

14.0 Clearance and Creepage:

See Annex 'B' of IS:8828/1996 for MCB and as per Appendix 'G' of IS:13947 (Part-I) /1993 for enclosure.

15.0 Tests:

15.1 Type Tests on MCBs:

MCBs of each of 10,20,32 & 40 Amp. rating separately should be fully Type Tested by the laboratories accredited by National Accreditation Board for Testing and Calibration Laboratories (NABL) in accordance with Clause No.: 9 of IS 8828/1996 for all the following Test sequences:

Test Sequence	IS Clause No.	Test
A	6	Marking
	8.1.1	General
	8.1.2	Mechanism
	9.3	Indelibility of marking
	8.1.3	Clearance and creepage distances (external parts only)
	8.1.6	Non - interchangeability
	9.4	Reliability of screws, current carrying parts and connections
	9.5	Reliability of terminals for external conductor
	9.6	Protection against electric shock
	8.1.3	Clearance and creepage distances (internal parts only)
	9.14	Resistance to heat
	9.15	Resistance to abnormal heat and to fire
	9.16	Resistance to rusting
B.	9.7	Dielectric properties
	9.8	Temperature rise
	9.9	28 days test
C.	9.11	Mechanical & Electrical endurance
	9.12.11.2	Performance at reduced Short-Circuit currents
	9.12.12	Verification of Circuit Breaker after Short Circuit tests.
D.	D0 9.10	Tripping characteristic
	D1 9.13	Resistance to mechanical shock and impact
	9.12.11.3	Short-Circuit performance at 1500 A
	9.12.12	Verification of Circuit Breaker after

Short Circuit tests.

- E1 9.12.11.4.2 Perf.at Service S.C.capacity(Ics)
- 9.12.12 Verification of Circuit breaker

after Short Circuit test

- E. {-----}
- E2 9.12.11.4.3 Perf. at Rated S.C. capacity (Ics)
 - 9.12.12 Verification of Circuit breaker
after Short Circuit test

15.2 The following Acceptance and Routine tests on each 10,20,32 & 40 A rating of MCBs should be carried out in accordance with the procedure given in IS:8828/1996.

Following tests shall be carried out as Acceptance Test in addition to Routine Tests.

Test Sequence	IS Clause No.	Test	
A	6	Marking	
	8.1.1	General	
	8.1.2	Mechanism	
	9.3	Indelibility of marking	
	8.1.3	Clearance and creep age distance (external parts only)	
	8.1.6	Non-interchangability	
	9.4	Reliability of screws, current carrying parts and connections	
	9.5	Reliability of terminals for external conductor	
	9.6	Protection against electric shock	
	8.1.3	Clearance and creep age distance (internal parts only)	
	9.14	Resistance to heat.	
	9.15	Resistance to abnormal heat and to fire	
	9.16	Resistance to rusting	
	B.	9.7	Dielectric properties
		9.8	Temperature rise
	D.	Do 9.10	Tripping characteristic
{----- D1 9.13		Resistance to mechanical shock and impact	

15.3 Routine Tests:

- 1) High Voltage Test at 2500 V for 1 second.
- 2) Over current device calibration test

- 3) Time -current operating test as per Table 6 of IS:8828/1996.
- 4) Tripping characteristic test as per Table 6 of IS:8828/1996.

15.4 Test Reports:

The tenderer shall furnish detailed type test reports of the offered MCBs for all the tests as per clause 15.1 of this specification. All the above Type Tests shall be carried out at laboratories which are accredited by the National Accreditation Board of Testing and Calibration Laboratories (NABL) of Government of India to prove that the MCBs offered meet the requirements of the specification. These type tests should have been carried out within five years prior to the date of opening of this tender. However, the tenderers who have supplied the MCBs to this Company against order from Central Purchase Agency of M.S.E.D.C.L. shall be exempted from submission of type test reports against this tender provided

- (i) their offered MCBs are already fully type tested at Laboratories accredited by the National Accreditation Board for Testing and Calibration Laboratories (NABL) within five years prior to the date of opening of the tender .
- (ii) there is no change in the design of type tested MCBs and those offered against this tender.
- (iii) Such tenderers complying (i) and (ii) above shall furnish an undertaking in the format scheduled 'F' enclosed herewith.

The detailed type test reports alongwith the relevant oscillograms/certified drawings etc. or undertaking seeking exemption from their submission in the format schedule 'F', are to be submitted in sealed cover on or before 14.00 hours on the same date of the month one month after the date of tender opening (e.g. if the tender is opened on 3rd June, the submission of type test reports shall be on or before 3rd July) or the next working day in case the same date is a holiday duly superscribed on it following details :

" Type Test Reports of MCBs against Tender No. -----
opened on ----- "

The sealed covers shall be opened at 15.00 hours on the same day in presence of the tenderers who choose to be present.

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. For this purpose, the tenderer shall quote unit rates for carrying out each Type

Test. However, such unit rates will not be considered for evaluation of the offer. In case the unit fails in the Type Tests, the complete supply shall be rejected.

The successful tenderer will take approval / waiver of type test from C.E.(Dist.),M.S.E.D.C.L. , Prakashgad , Bandra(E), Mumbai prior to commencement of supply.

16.0 Inspection:

All tests and inspection shall be made at the place of manufacture. All reasonable facilities, should be made available without any charge to the inspector (representing the purchaser), to satisfy him that the material, is being supplied in accordance with this specification.

17.0 Drawings :

Tender will have to submit drawings of MCBs and their enclosures (for different ratings) for our consideration alongwith their bids. He is also required to submit the guaranteed Technical particulars of MCBs/ enclosure in schedule 'A' attached herewith.

The constructional drawing (terminal and internal assembly) and overall dimensional drawing of MCBs offered shall be submitted with the offer.

18.0 MINIMUM MANUFACTURING FACILITIES:-

18.1 The tenderer should have following manufacturing facilities in house to prove his reliability as a manufacturer of MCBs.

- 1) Moulding Machine with moulds.
- 2) Set of spot welding machines.
- 3) Cutting, welding etc machines for fabrication.
- 4) Thermal multipole calibration bench.
- 5) Spring Testing Machine.
- 6) Fine Pitch threading machine.
- 7) Coil winding machine.

18.2 Bought out items:-

A detailed list of bought out items which are used in the manufacturing of MCBs should be furnished indicating the name of the firms from whom these items are procured. The bidder shall also give the details of quality assurance procedures followed by him in respect of the bought out items.

19.0 MINIMUM TESTING FACILITIES:-

The tenderer should have the necessary minimum testing facilities for carrying out the following tests as per clauses mentioned.

Test Sequence		
Test Sequence	IS Clouse No.	Test
A	6	Marking
	8.1.1	General
	8.1.2	Mechanism
	9.3	Indelibility of marking
	8.1.3	Clearances and creep age distance (external parts only)
	8.1.4	Non-interchangability
	9.4	Reliability of screws, current carrying parts And connections
	9.5	Reliability of terminals for external conductor
	9.6	Protection against electric shock
	8.1.3	Clearances and creep age distance (internal parts only)
	9.14	Resistance to heat
	9.15	Resistance to abnormal heat and to fire
	9.16	Resistance to rusting
B.	9.7	Dielectric properties
	9.8	Temperature rise
D	Do	9.10 Tripping characteristic

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The offer shall stand rejected if any of the Minimum Manufacturing Facilities and Minimum Testing Facilities as above in good working condition at the time of factory inspection are not available.

20 The offers without following documents shall stand rejected.

1. Type test report and accreditation certificate required as per Clause No. 15.1 and 15.4.
2. All the relevant information in schedule 'A' i.e. Guaranteed Technical Particular (GTP) as per cl. No. 21.
3. Drawings required as per clause 17.

21 Schedule:

The tenderer shall fill in the following schedules which forms part and parcel of the tender specification and offer. If the schedules are not submitted duly filled in with the offer, the offer shall be liable for rejection.

Schedule 'A'	...	Guaranteed and technical particulars.
Schedule 'C'	...	Tenderer's Experience
Schedule 'F'	...	Proforma of Undertaking.

SEAL AND SIGNATURE OF THE TENDERER

ANNEXURE-I

PRINCIPAL TECHNICAL PARAMETERS OF SINGLE POLE M.C.B.

A) FOR ENCLOSURE

1. MATERIAL OF ENCLOSURE : CRCA Steel
2. THICKNESS OF SHEET STEEL : 1.25 mm (18 SWG)
3. CATEGORY OF PROTECTION : IP-40
4. DIMENSION OF ENCLOSURE
 - HEIGHT : 140mm
 - DEPTH : 60mm
 - WIDTH : 55mm

B) MCB

- 1 IS REFERENCE : I.S.8828/1996
I.S.13947(Part-1)/1993
- 2 NO OF POLE : Single pole
- 3 RATED CURRENT : 10,20,32 & 40 Amp.
- 4 RATED VOLTAGE AND FREQ. : 240 V & 50 Hz.
- 5 RATED SHORT CIRCUIT CAPACITY : 6 kA
- 6 RATED SERVICE SHORT CIRCUIT CAPACITY : 6 kA
- 7 TERMINALS : AS PER CLAUSE NO.11 OF SPECIFICATION.

- C) TYPE TESTS REPORT NO. : AS PER CLAUSE NO.15.4 OF SPECIFICATION.**

Schedule 'A'

GUARANTEED TECHNICAL PARTICULARS

- A) FOR ENCLOSURE
- 1 NAME OF MANUFACTURER : TEXT
 - 2 MATERIAL OF ENCLOSURE : TEXT
 3. THICKNESS OF SHEET STEEL (mm) : NUMERIC
 4. CATEGORY OF PROTECTION : TEXT
 5. DIMENSION OF ENCLOSURE
 - HEIGHT (mm) : NUMERIC
 - DEPTH (mm) : NUMERIC
 - WIDTH (mm) : NUMERIC
- B) MCB
- 1 IS REFERENCE : TEXT
 - 2 TRADE MARK : TEXT
 - 3 TYPE/DESIGNATION : TEXT
 - 4 NO OF POLE : TEXT
 - 5 RATED CURRENT (Amp) : NUMERIC
 - 6 RATED VOLTAGE AND FREQ.
(Volts & Hz) : TEXT
 - 7 RATED SHORT CIRCUIT
CAPACITY (kA) : NUMERIC
 - 8 RATED SERVICE SHORT CIRCUIT
CAPACITY. (kA) : NUMERIC
 - 9 WHETHER TERMINALS ARE AS PER
CLAUSE NO.11 OF THIS
SPECIFICATION. : BOOLEAN
- C) WHETHER TYPE TESTS REPORTS
ARE AS PER CLAUSE NO.15.4 OF
THIS SPECIFICATION : BOOLEAN

(TO BE ENCLOSED WITH OFFER)

SCHEDULE 'C'

SCHEDULE OF TENDER'S EXPERIENCE

Tenderer shall furnish here a list of similar orders executed/under execution by him to whom a reference may be made by purchaser in case he considers such a reference necessary

Sr.No	Name of client & Description of ordered items.	Value of order	Period of supply and commissioning along with size and qty.	Name and address to whom reference may be made
1	2	3	4	5

Name of Firm

Name and Signature of Tenderer

Designation

Date :

SCHEDULE ' F '

PROFORMA OF UNDERTAKING

We hereby confirm that the MCB offered by us against this tender are of the same design and type as have been supplied to M.S.E.D.C.L. against earlier order No. _____ dated _____ and all the type test reports thereof were approved by C.E.(Dist.) vide letter No. _____ dated _____ (copy enclosed).

We further confirm that the said type tests have been carried out at the laboratories accredited by NABL within five years prior to the date of opening of the present tender.

SEAL & SIGNATURE OF THE TENDERER

