

## **SECTION -III**

### **TECHNICAL SPECIFICATION FOR SUPPLY OF MOULDED CASE CIRCUIT BREAKER AGAINST TN-2354.**

#### **3.1.1 SCOPE:**

This specification covers design, manufacture, assembly, testing at manufacturer's works before dispatch and delivery at Nigam stores any where in the jurisdiction of Jaipur Discom of Moulded Case Circuit Breakers (MCCBs) of specified current ratings and suitable for three/single phase LT circuits as mentioned hereunder.

#### **3.1.2 TECHNICAL REQUIREMENTS OF SPECIFICATIONS:**

##### **3.2.1 General description and Standards:**

The Moulded Case Circuit Breaker shall be generally confirming to IS: 13947-2/ 1993 or IEC: 60947-2 as amended up to date. The rated uninterrupted current of Three Pole MCCB shall be 100 Amp with the overload release set at 63 Amps (for MCCBs to be installed with 40 KVA Three Phase DT), overload release set at 40 Amps (for MCCBs to be installed with 25 KVA Three Phase DT) and overload release set at 32 Amps (for MCCBs to be installed with 16/10 KVA Three Phase DT). The rated uninterrupted current of Single Pole MCCB shall be 150 Amp. for 25 KVA Single Phase Distribution Transformers with fixed overload release setting 135 Amp., 100 Amp. for 16 KVA single Phase Distribution Transformers with fixed overload release setting 80 Amp. and 60 Amp. for 5 KVA Single Phase Distribution Transformers with fixed overload release setting 25 Amp. The MCCB meeting the specified tripping characteristic shall be of utilization category-A (To be tested on test sequence 1, 2 & 3 of relevant IS) and fully type tested as per relevant standards and such type test certificates shall be furnished along with the tender.

The manufacturer should have valid ISI license/ applied with BIS for the tendered item shall be preferred. Document in support of having ISI License or have applied for the same with BIS shall be enclosed with the tender offer.

##### **3.2.2 Make and Models:**

The MCCB shall directly be purchased from the manufacturers. The make and offered model number shall be indicated invariably in the price schedule as well as Guaranteed Technical Parameters of the tender documents. All the Manufacturers shall enclose Credentials related with type-testing of their product as per the specifications of this tender and past supplies to the Govt. Purchasers and performance certificates from such users for performance and after sale services provided by the manufacturer. The offer found not furnishing the aforesaid information with tender documents might be ignored.

### 3.2.3 Electrical Ratings:

The MCCB's shall be manually independent and shall have quick make-quick break Mechanism and **push to trip facility**. The MCCB shall comply with the electrical parameters detailed as under:

S. N.	Parameters	Required parameter range/ ratings.	
		TP MCCB	SP MCCB
1.	Application	Outdoor enclosed type	
2.	Specified reference ambient temperature range for which overload release is independent.	(-) 5 degC to (+) 50 deg C	
3.	No. of Poles	Three	One
4.	Rated Insulation Level	660 Volt	660 Volt
5.	Rated operating voltage	415 Volts	240 Volts
6.	Impulse withstand voltage (kV)	8 kVolts	
7.	Continuous Operating Current rating (Frame size)	100 Amps as specified in 3.2.1 above.	150 Amp. for 25 KVA, 100 Amp. for 16 KVA and 60 Amp. for 5 KVA Single Phase Distribution Transformers.
8.	Fixed Overload release setting Amp.	63 Amp. for MCCBs to be installed with 40 KVA Three Phase DTs, 40 Amps for MCCBs to be installed with 25 KVA Three Phase DTs & 32 Amps for MCCBs to be installed with 16/10 KVA Three Phase DTs.	135 Amp. for 25 KVA, 80 Amp. for 16 KVA and 25 Amp. for 5 KVA Single Phase Distribution Transformers
9.	Rated ultimate short circuit breaking capacity (Icu)	Not less than 18 KA at rated voltage and 0.4 PF.	
10.	Rated service short circuit breaking capacity (Ics)	100% of Icu at rated voltage and 0.4 PF.	
11.	Power Factor for Short Circuit (Max.)	0.4 (Lag)	
12.	Utilization Category.	"A" (IS: 13947/1993 as amended up to date)	
13.	Type of MCCB: Trip mechanism.	Hydro-magnetic / Thermal Magnetic with trip free mechanism.	
14.	Design.	Current limiting design with fast operating time & low thermal stress with compact size.	

### 3.2.4 Time-current characteristics:

The L.T. MCCB shall not cause any nuisance tripping due to switching current of motor & capacitor loads and shall have the following Time Current characteristics:

Multiple of normal current setting	Tripping time
1.05	More than 2.5 Hrs.
1.2	More than 10 minutes & less than 2 Hrs.
1.3	Less than 30 minutes.
1.4	Less than 10 minutes.
2.5	Less than 1 minute.
6.0	Less than 5 seconds.
12.0	Instantaneous (less than 40 milli seconds).

For above time / current characteristics, reference calibration temperature of the breaker shall be 50 Deg. C. Deration (Reduction in continuous rating due to increase in operating temperature), if any, up to ambient temp of 60 Deg. C. shall not exceed 10% of the current setting indicated above.

### 3.2.5 Additional features:

The Moulded Case Circuit Breaker shall have the following additional features:

- i The three-pole/ Single Pole MCCB to be provided on LV side having overload trip- release with inverse-time characteristics for overload-protection and magnetic trip-release for instantaneous tripping in the wake of short circuits.
- ii The MCCB shall be marked with "brand-name" of the manufacturer and Service breaking capacity, Ics in KA duly embossed on casing on front-side. The other particulars may be marked as per prescribed marking norms in IS:13947 and IEC: 60947-2 with standard practice of manufacturer.
- iii The contacts of MCCB shall be self-wiping type so as to keep the contacts clean and low milli-volt drop.
- iv The MCCB shall preferably have appropriate provision like position of switch different from ON & OFF state to indicate tripping of MCCB.It shall help avoid damages while handling the MCCB at site.
- v The MCCB shall have flexible mounting with line-load reversibility feature i.e. no-change in rating & breaking capacity of MCCB when mounted in different orientations and with line & load connections changed.
- vi The overload element of each pole of MCCB shall be individually calibrated and tested to ensure reliability. Every trip-latch shall be specially heat-treated, hardened & polished to grind finish to provide accurate tripping characteristics in close tolerance limits.
- vii In order to facilitate adequate safety to workmen while working on LT feeder beyond Distribution Transformer, the MCCB shall have suitable disconnecting functions with positive isolation feature as per provisions of relevant standard.

- viii In case of thermal type of release, the manufacturer shall be prepared to state the influence of variations in the ambient temperature range of (-) 5 degC to (+) 50 deg C. and further effect on rating and performance with every 5 deg C increase in ambient up to (+) 75 deg C. for the purpose of such derating following information shall be furnished with offer for the offered model of the MCCB by the bidder.
- ix) Purchaser at his option may ask the supplier to supply the MCCB with the extended terminal without any price implication, if at any stage he feels so. Extended terminal should be mounted on the MCCBs properly with help of plain washer backed with spring washer. The correct sequence for termination on MCCBs (incoming & outgoing sides) and connection of cable on extended terminal are as follows:
- a) MCCB side: Extended terminal Lug Plain Washer Spring Washer Bolt of suitable size.
  - b) Cable side: (Connection on Extended Terminal): Nut Spring Washer Plain Washer Ext. Terminal Lug Plain Washer Bolt of suitable size.
- x) The brand name of the MCCB along with Ics value in KA should be embossed/ engraved on front of the MCCBs to avoid spurious product.
- xi) The consecutive serial number on MCCBs of each rating shall be marked on casing on one side. The MCCB shall also marked tender number along with marking of **PROPERTY OF JVVNL**.

S.N.	Ambient temperature of surroundings of MCCB in operation	Derating of MCCB in % from its standard rating at reference temperature of 50 degC.
1	55 DegC	
2	60 DegC	
3	65 DegC	
4	70 DegC	
5	75 DegC	
6	80 DegC	

### 3.2.6 Type, Size and Clearance of input-output terminals:

The terminal of input-output side of MCCB shall be suitable either for bottle type lugs or for U-type lugs of size for various rating of MCCBs as mentioned below:

S.N.	Rating of MCCB IN Frame / fixed overload setting , Amp	Lugs suitable for Copper cable of size in sq.mm	Remarks
1	100/63 Amp., 100/40 Amp & 100/32 Amp.	Terminals shall be either cage-clamp type to accommodate bottle type lugs or Screw type to accommodate U-	Clearance between phases shall be sufficient to insert either bottle/U-type/Ring Type lugs

		type/Ring type lugs.	with 35 sq.mm copper cable.
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**The aforesaid technical parameters of MCCB shall be specifically indicated in the relevant item of GTP. -In order to ensure proper clearance between phases after fixing of lugs; suitable phase-barriers shall be supplies with each MCCB as accessory.**

### **3.3 TYPE TESTS:**

The following certificates for type tests are essentially required:

3.3.1 The bidder shall enclose type test certificate for all type and acceptance test of sequence of tests-I, II & III of IS13947/IEC60947-2 complete with certified drawings, Oscillograms and approved drawing carried out from any testing house as indicated in clause No. 3 of Qualifying Requirement (Schedule-III-A) for the make and model quoted. It shall be essentially required to be furnished along with the offer clearly stating the ambient conditions under which test has been conducted. The type test certificates furnished with offer should not be older than 5 years from the date of opening of tender.

3.3.2 All the necessary tests/checks shall be carried out as per the stipulations of IS: 13947/1993-part-2 (latest amended) / IEC60947-2 or equivalent International standards.

#### **3.3.3 Verification of material and Type tests on sample MCCB of first lot:-**

- i) The successful supplier shall offer first lot of MCCBs comprising minimum 1,000 Nos. of MCCBs (or 20% of ordered quantity whichever is more) for inspection. After satisfactory inspection, testing & clearance from purchaser, the material shall be dispatched to Nigam's stores.
- ii) Three samples of each rating (**for Test Sequence-I, II & III**) for balance type test shall be selected & sealed by the purchaser from the first lot received in Nigam's stores and shall be sent for type tests as per clause No. 3.3 of specification at any testing house as indicated in Clause No. 3 of Qualifying requirement (Schedule-III-A). The type test charges shall be borne by the supplier. The purchaser however in first instance may pay testing charges to the testing agency, which shall be recovered by Sr.AO (CPC) from the bill of the supplier. **However, the requirement of arranging "type test" not to be insisted on the supplier who have arranged type test reports of Test Sequence- I, II & III of IS13947/IEC947-2 complete with certified drawings, Oscillograms and approved drawing of any NABL accredited test laboratories/ Govt. approved lab for the make and model before commencement of supply. The type test should not be older than Five years from the date of opening of tender.**

- iii) The supplies, at the option of purchaser, may be utilized in the field after successful testing of 1% quantity or 10 Nos. samples whichever is more of each rating from the quantity consigned to each store(s) in respect of the tests mentioned below, at purchaser's lab. The supplier can continue supplying material in anticipation of successful type test(s) results. The payment to supplier shall be released only after receipt of successful type test reports. However, in case of suppliers who have already got type tested of material of same rating or higher may be allowed to make 70% payment of the supplies.

- 1 Visual examination and overall dimensional checking and weight/ marking.

In case of failure of samples of lot/ sub-lot in the test(s) detailed above, the entire quantity of respective lot/sub-lot shall be rejected and shall have to be replaced by the supplier at his own cost. Repeated failure/ poor results in the testing may render cancellation of order.

**The successful testing of all samples in respect of tests mentioned above shall be the acceptability criteria of the lot/sub-lot.**

- iv) In case of successful type test results, supplies shall be continued. However, in case of failure in type test(s), double the sample of each rating shall be selected from the supplies already received to get them type tested as per clause 3.3.3(ii) above at supplier's cost. In case of failure of any samples in type test(s), the order of balance quantity including the quantity lying unused in the stores/ field shall be cancelled. The guarantee period of quantity already supplied & used shall be doubled and payment for used MCCBs shall be arranged after deducting 30% cost of consignment (s) used.
- v) However, purchaser may allow the supplier to re-offer the material after change/ modification in the design of MCCBs. The balance material shall be accepted only after successful type testing. The type testing charges shall be borne by the supplier.
- vi) Due notice shall be given to supplier for such sample selection and such testing thereof to enable them to be present for the same if so desired by them. If the supplier or his authorized representative fails to attend the sample selection and testing, the same shall be carried out unilaterally by the purchaser and the results thereof shall be binding upon the supplier.
- vii) The purchaser also reserves the right to get additional samples for all or any of the selected tests at purchaser's cost at any independent test house at any stage of supply if so considered necessary to ensure that the quality of MCCBs being offered for inspection is same as already got type tested. In case of failure, the guarantee period of the quantity already supplied by the supplier shall be doubled and purchaser reserves the right to cancel the balance quantity.

### **3.4 SAFETY REQUIREMENTS:**

The Moulded Case Circuit Breaker shall be designed and constructed in such a way as to avoid introducing any danger in normal use and under normal working conditions, so as to ensure especially Personal safety against electric shock/ against effects of excessive voltage and Safety against spread of fire etc. The Product should be produced from a special material which reduces electrical leakage through and across the moulding in a negligible minimum and all metal parts wherever provided should be well insulated. The metallic parts of the equipment shall not remain exposed.

The design of the equipment should be based on IEC: 60947-2 safety standards enabling safe operation.

### **3.5 PACKING:**

The packing of the equipment shall be such that it should not get damaged during transit. Each MCCB shall be supplied with a hard paper /card board carrying case suitable for easy portability, rugged use and to prevent damage during transit in addition to packing as per relevant clause of GCC. The MCCB should be immune to vibrations and shocks in normal transportation and handling.

### **3.6 INSPECTIONS AND TESTING:**

It shall be governed by clause 1.27 of General conditions of Contract. Before dispatch, the MCCBs shall be inspected and tested by the authorized inspecting officer/Agency of the Purchaser at the works of the manufacturer. The manufacturer/supplier shall furnish the details of routine and acceptance tests, which shall be arranged at the time of inspection required as per relevant ISS to ascertain testing at the manufacturer's works in presence of purchaser's representative with following.

**3.6.1** All Acceptance tests as laid down in the ISS/purchaser's specification of TN-2354 including following Routine & Acceptance Tests in addition to tests of test sequence I as per IS 13947/ 1993 shall also carried out at the works of manufacturer during inspections:

1. Visual examination and overall dimensional checking.
2. Inspection of wiring and electric operation test.
3. Verification of dielectric properties test.
4. High Voltage test at 2.5 KV for one minute between:
  - a)-Main circuit & earth.
  - b)-Each pole with other two poles shorted with MCCB in closed condition.
  - c)-Control circuit and earth.
  - d)-Shorted top and bottom terminals with MCCB in open conditions.
5. Insulation resistance test (IS: 8623) with 1000 V MEGGER between above points of S.N.4.
6. Checking availability of all special features such as line-load reversibility & positive isolation etc. and accessories specified.

7. Power frequency test(IS:8623)
8. Milli-volt drop (IS:5147)
9. Degree of protection(IS:8084)
10. Temperature rise test (conducted one sample of each rating out of 1000 Nos. or part thereof) in which contact resistance (mili volt) shall also be indicated.
11. Verification of time current characteristics (conducted one sample of each rating out of 1000 Nos. or part thereof).

**3.6.2** The criteria for selection of number of samples and for acceptance of lot shall be on 1% quantity or 10 Nos. samples whichever more of each rating is. Before dispatch, the MCCBs shall be inspected and tested by the authorized inspecting officer/Agency of the Nigam at the works of the manufacturer. The manufacturer/supplier shall furnish the details of tests, which shall be arranged at the time of inspection as per relevant ISS/IEC to ascertain routine testing at the manufacturer's works in presence of purchaser's representative.

**The successful testing of all samples in respect of tests mentioned at s.no. 3.6.1 to 3.6.2 above shall be the acceptability criteria of the lot/sub-lot.**

### **3.7 COMPLETENESS OF EQUIPMENT:**

Any fittings accessories or apparatus, which may not have been specifically mentioned in the specification, shall be deemed to be included and shall be supplied by the supplier without any extra charges. The MCCB shall be a complete unit in all respect whether such details are mentioned in this specification or not.

### **3.8 MAINTENANCE AND GUARANTEE:**

It shall be governed by clause no. 1.40 of General Conditions of Contract except that the successful bidder shall have to provide the guarantee of 36 (thirty six) months from the date of receipt of material in Nigam's store. The MCCBs found defective within the above guarantee period shall be replaced by the supplier free of cost within a period of one month from date of intimation.

### **3.9 BID SAMPLES:**

Each bidder have to furnish one No. sample of each rating of Three Phase & single Phase MCCB along with their offer failing which their offer may be ignored.

### **3.10 PRICES:**

The quoted prices shall be all adjusted unit FOR destination price inclusive of Excise Duty, Cess and Central Sales tax / VAT , freight ,Insurance and entry tax etc in respect of MCCB. If any duty and/ or taxes are applicable at concessional rate, the same shall be clearly mentioned otherwise full rate of ED with cess and CST/VAT shall be taken for working out prices for comparison. The prices shall be quoted with complete break-up of ex-works price along with applicable taxes & duties as mentioned above. **The prices are 'FIRM'.**



### **3.11. Makes of MCCB**

The following makes of MCCB shall only be accepted:

Siemens/ L&T/ ABB/ GE Power/ Schneider-France/ SPACEAGE – Hyundai/  
HAVELLS/C&S/ HPL.

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