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BHEL-ELECTRONICS DIVISION

TRACTION ENGINEERING

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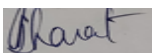
Purchase Specification of Miniature Circuit Breaker (MCB) For EMU Projects (Rolling Stock Applications)

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REVISION HISTORY

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0.0	09.10.2019	First Issue
1.0	12.10.2019	Environmental Conditions added.
2.0	12.02.2021	Fire Protection Clause & End Cap Code
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1. SCOPE OF PURCHASE SPECIFICATION

This purchase specification is intended to specify the requirements of Miniature Circuit Breakers up to 16Amp rating (henceforth will be abbreviated as MCB in this document) for Rolling Stocks Applications only.

The requirement of MCBs specified in this purchase specification will be used inside Control Panels of Rolling Stock Projects for protection of Power and Control Circuits.

The vendor has to confirm in writing his complete compliance with this specification (where ever required the respective test certificate also to be provided) and associated techno-commercial terms. If the vendor has any queries regarding specifications, it is his responsibility to get the same clarified from the purchaser before submitting the offer. If during approval stage any deficiency is found in the equipment offered, vendor has to provide the additional required components (if any) or make necessary modifications to comply with the specifications, without any cost and time implications to BHEL.

Vendors shall be fully responsible for the supplied item(s). The compliance to this specification does not absolve the vendor of his responsibility towards contractual obligations with regards to completeness, proper selection, satisfactory operation and maintenance.

Item supplied shall be of proven quality both with respect to design and materials.

Prototype item of an experimental nature shall not be offered or supplied. The system shall have well proved system records. In the event of any conflict with the specifications, datasheets, related standards, codes etc. the vendor shall refer the matter to the purchaser for the clarification and only after obtaining the approval/concurrence from the Purchaser vendor should proceed with the manufacture/engineering and supply of the item in question.

2. **DEFINITION of MCB:** MCBs or Miniature Circuit Breakers are electromechanical devices which protect an electric circuit from an overcurrent. The overcurrent, in an electrical circuit, may result from short circuit, overload or faulty design.
3. **WORKING PRINCIPLE:** Whenever continuous over current flows through MCB, the bimetallic strip is heated and deflects by bending. This deflection of bimetallic strip releases mechanical latch. As this mechanical latch is attached with operating mechanism, it causes to open the miniature circuit breaker contacts, and the MCB turns off thereby stopping the current to flow in the circuit. To restart the flow of current the MCB must be manually turned ON. This mechanism protects from the faults arising due to over current or over load.

But during short circuit condition, current rises suddenly, causing electromechanical displacement of plunger associated with a tripping coil or solenoid. The plunger strikes the trip lever causing immediate release of latch mechanism consequently open the circuit breaker contacts.

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4. GENERAL INFORMATION:

- A. Category: Low voltage product and system.
- B. Should be a current limiting device.
- C. Should have unique bus connection system on the input side
- D. Product should be IEC, EN or CE certified.
- E. Mounting should be on DIN rail (35mm size). (maximum width up to 35 mm)
- F. It should have finger safe terminals.

5. TECHNICAL REQUIREMENTS:

Sl.No.	Characteristics	Acceptance Criteria
A.	Standards	1. IEC61373 (Resistance to Shock & Vibration) 2. For Fire protection, the hazard level of item is to be HL2 as per EN 45545 part 2
B.	Min. operating voltage	12V AC/DC
C.	Trip Characteristic	Min. 5 to Max. 20 times of the rated current. (Tripping Char. C or K both are acceptable) (Kindly refer figure-1 on the next page for the trip characteristic)
D	Application Voltage	110±10%Vac, 1ph / 110V±25% dc. Same MCB should be suitable for use in both AC & DC Circuits. Vendor has to give compliance certificate in this regard.
E.	Rated current (In):	2A - 16 A (based on the type of MCB)
F.	Voltage interrupting capacity for nominal voltage 110Vdc/110Vac,1ph	10kA
G.	Frequency (for 110Vac 1Ph)	50 / 60 Hz
H.	Protection category:	Minimum IP20
I.	Combination with auxiliary contact	To be compulsorily provided for Type-B, Type-D, Type-I & Type-J. Optional for other Types (refer Sec.7)
J.	Wire Size for Main (power) terminal	Terminal shall be suitable for copper cables of conductor cross section 1.0 sq.mm to 35 sq.mm and should be suitable for standard bus bar connection on Input terminals.

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K.	Wire Size for Auxiliary contact terminal	Max. 2.5 sq.mm. and less
Sl.No.	Characteristics	Acceptance Criteria
L.	Mounting of MCB	On DIN rail width 35 mm, acc. to EN 60715
M.	Storage temperatures	-5°C to + 55°C
N.	Working Ambient temperatures:	-5°C to +55°C Ambient temperature may go up to +70°C. The technical offer shall specify the design temperature. (Supplier to provide de-rating curve from the design temperature)
O.	Maximum Dimension (including Auxiliary Contact)	Max. Length: 44mm Max. Depth: 70 mm Max. Height : 90 mm

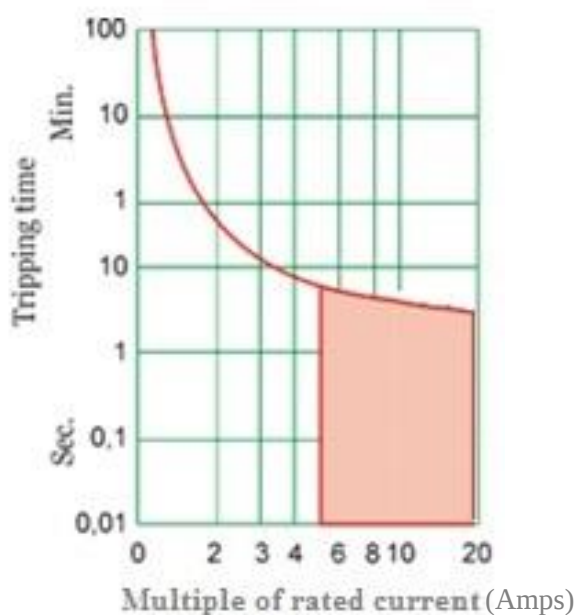


Figure-1: Tripping Characteristics of MCB required under this specification

6. Environmental Conditions:

- Relative Humidity:** >90% saturation during rainy season.
- Ambient Temperature:** -5°C to +55°C, which may go up to +70°C.
- Altitude:** MCBs and accessories should work satisfactorily at any altitude between 0 and 1776m above mean sea level.

Note: Supplier to mandatorily provide conformance certificate (along with Technical Offer) of the offered items complying with the Environmental conditions as above.

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7. ITEMS COVERED IN THIS PURCHASE SPECIFICATION

TYPE No.	Brief Description	Material Code
MCBs for Universal AC & DC Application		
TYPE-A	Two Pole MCB, 2 Amp for AC/DC Circuit. (Nominal operational voltage: 110Vac / 110Vdc) Tripping Char: As described in Section-5, Sl. No. C of this document. Maximum Dimensions(in mm): LXD _X H: 35X70X90	TI0668126621
TYPE-B	Two Pole MCB, 2 Amp for AC/DC Circuit with Auxiliary Contact # (Auxiliary Contact may be in-built with the Main MCB or may be removable. Supplier can provide Auxiliary Contact on either left, right or bottom side of the Main MCB). (Nominal operational voltage: 110Vac / 110Vdc) Tripping Char: As described in Section-5, Sl. No. C of this document. Maximum Dimensions(in mm): LXD _X H: 44X70X90 <i>(Item to be supplied in assembled condition, i.e., Auxiliary Contact should be fixed with MCB)</i>	TI0668126639
TYPE-C	Two Pole MCB, 6 Amp for AC/DC Circuit (Nominal operational voltage: 110Vac / 110Vdc) Tripping Char: As described in Section-5, Sl. No. C of this document. Maximum Dimensions(in mm): LXD _X H: 35X70X90	TI0668126647
TYPE-D	Two Pole MCB, 6 Amp for AC/DC Circuit with Auxiliary Contact # (Auxiliary Contact may be in-built with the Main MCB or may be removable. Supplier can provide Auxiliary Contact on either left, right or bottom side of the Main MCB). (Nominal operational voltage: 110Vac / 110Vdc) Tripping Char: As described in Section-5, Sl. No. C of this document. Maximum Dimensions(in mm): LXD _X H: 44X70X90 <i>(Item to be supplied in assembled condition, i.e., Auxiliary Contact should be fixed with MCB)</i>	TI0668126655
TYPE-E	Two Pole MCB, 10 Amp for AC/DC Circuit (Nominal operational voltage: 110Vac / 110Vdc) Tripping Char: As described in Section-5, Sl. No. C of this document. Maximum Dimensions(in mm): LXD _X H: 35X70X90	TI0668126663

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TYPE No.	Brief Description	Material Code
TYPE-I	Two Pole MCB, 10 Amp for AC/DC Circuit with Auxiliary Contact # (Auxiliary Contact may be in-built with the Main MCB or may be removable. Supplier can provide Auxiliary Contact on either left, right or bottom side of the Main MCB). (Nominal operational voltage: 110Vac / 110Vdc) Tripping Char: As described in Section-5, Sl. No. C of this document. Maximum Dimensions(in mm): LXD_XH: 44X70X90 <i>(Item to be supplied in assembled condition, i.e., Auxiliary Contact should be fixed with MCB)</i>	TI0668111453
TYPE-F	Two Pole MCB, 16 Amp for AC/DC Circuit (Nominal operational voltage: 110Vac / 110Vdc) Tripping Char: As described in Section-5, Sl. No. C of this document. Maximum Dimensions(in mm): LXD_XH: 35X70X90	TI0668126671
TYPE-J	Two Pole MCB, 16 Amp for AC/DC Circuit with Auxiliary Contact # (Auxiliary Contact may be in-built with the Main MCB or may be removable. Supplier can provide Auxiliary Contact on either left, right or bottom side of the Main MCB). (Nominal operational voltage: 110Vac / 110Vdc) Tripping Char: As described in Section-5, Sl. No. C of this document. Maximum Dimensions(in mm): LXD_XH: 44X70X90 <i>(Item to be supplied in assembled condition, i.e., Auxiliary Contact should be fixed with MCB)</i>	TI0668111461
TYPE-G	Input Busbar* for above two pole MCBs. Busbar to be made of Copper material. Required for Shorting/paralleling the input supply in a group of 9 nos. of two pole MCBs. Nominal Current Rating: Minimum 60Amp	TI0668126689
TYPE-H	End Cap suitable for Input Busbar as mentioned in Type-G	TI0668127671

Auxiliary Contact is required to monitor the status of MCB (On/Trip Status). When the MCB is ON, the Auxiliary Contact should be in “Close” condition.

*** Input Busbar is required for shorting the same terminals on input side of a group of MCB (more than 2 MCBs) so that common Input Supply can be fed at one place (instead of feeding individual MCBs).**

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8. WARRANTY

The material should be warranted against any defect arising out of the prescribed criterion for 18 months from the date of supply.

9. Documents to be provided along with technical offer:

Bidder is required to be provided following documents compulsorily along with the technical offer otherwise the offer is liable to be rejected:

- A. Compliance to the all the technical terms & conditions of this purchase specification.
- B. Compliance to Section 5(D): Bidder should give written compliance that the offered MCB is suitable for both AC & DC application.
- C. Compliance to Environmental Conditions as per Section-6.
- D. Offered Part nos. of all items (MCB, Auxiliary Contact, Busbar, End Caps, etc.) against each Type (Type-A to J) along with datasheet and dimensional drawing.
- E. De-rating Chart/Curve of the MCB with respect to temperature, as per Section 5(N).
- F. Type test certificate OR COC (Certificate of Compliance) of the offered items in compliance to IEC 61373 or EN61373 (resistance to shock & vibration) & EN45545-2(Fire Protection).

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