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PURCHASE SPECIFICATION
GROUP: TRACTION ENGINEERING

P.S NO. : PS4452541

REV. NO: 00

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SPECIFICATION FOR HIGH VOLTAGE INDICATOR

Code No. TI0668103531

REVISION HISTORY SHEET

REV. NO.	DATE	NATURE OF CHANGE	REASONS	PREPARED BY	APPROVED BY
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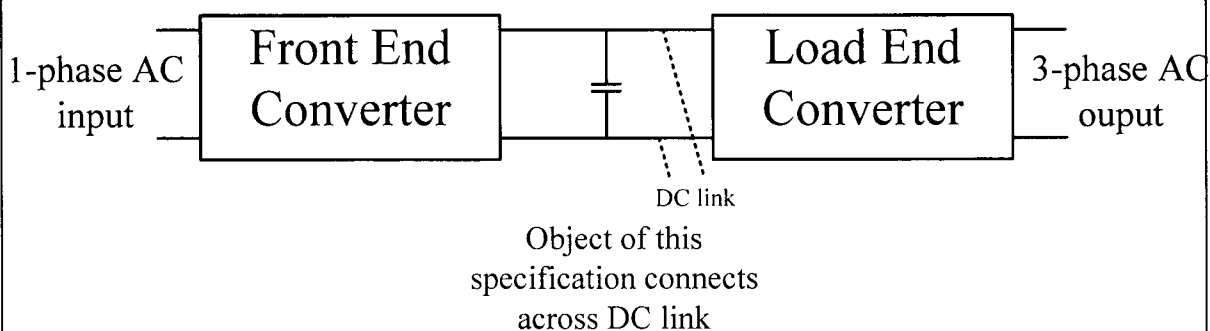
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SPECIFICATION FOR HIGH VOLTAGE INDICATOR

1.0 Functional requirements:

This document covers specification of a High voltage indicator, to be used at the DC link of an IGBT based converter. The indicator will be mounted in a cabinet/enclosure and will be used in traction applications for on board mounting. The block diagram is shown below.



2.0 APPLICATION : Indicating the DC voltage presence in traction equipment

3.0 TYPE : Dry Type, Air natural cooling

4.0 REFERENCE STANDARDS:

IEC 60571	Railway applications – Electronic equipment used on rolling stock
IEC 62498-1	Railway applications – Environmental conditions for equipment – Part 1: Equipment on board rolling stock

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SPECIFICATION FOR HIGH VOLTAGE INDICATOR

5.0 ENVIRONMENTAL CONDITIONS:

- 5.1 Ambient Temperature : 55°C
5.2 Maximum Temperature : 70°C (when locomotive standing dead under sun)
55°C (when locomotive working)
47°C Nominal
5.3 Relative Humidity : Up to 95% relative humidity, any moisture condensation during operation shall not lead any damage or failure
Yearly average $\leq$ 75% Relative Humidity
5.4 Altitude : Up to 1200 m above mean sea level
5.5 Atmosphere during hot weather: Extremely dusty and desert terrain in certain areas. The dust concentration in air may reach a high value of 1.6mg/cub meter.
5.6 Air Pollution : The equipment shall be designed to work in coastal area in humidity and salt laden corrosive atmosphere. The maximum values will be as follows
(a) Maximum pH Value : 8.5
(b) Sulphate : 7mg/litre
(c) Maximum concentrate of chlorine: 6mg/liter
(d) Maximum conductivity: 230 μ Siemens/m
5.7 Climate : Tropical, Hot and humid Climate

6.0 ELECTRICAL REQUIREMENTS

- 6.1 Input voltage range : 40 V to 4000 V DC or 40 V_{rms} to 4000 V_{rms}
6.2 Flashing frequency at 1 – 4 kV : 2Hz +/- 10%
6.3 Input current : < 5mA
6.4 Operating temperature : -50°C to +70°C

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SPECIFICATION FOR HIGH VOLTAGE INDICATOR

7.0 CONSTRUCTION

7.1 Housing:

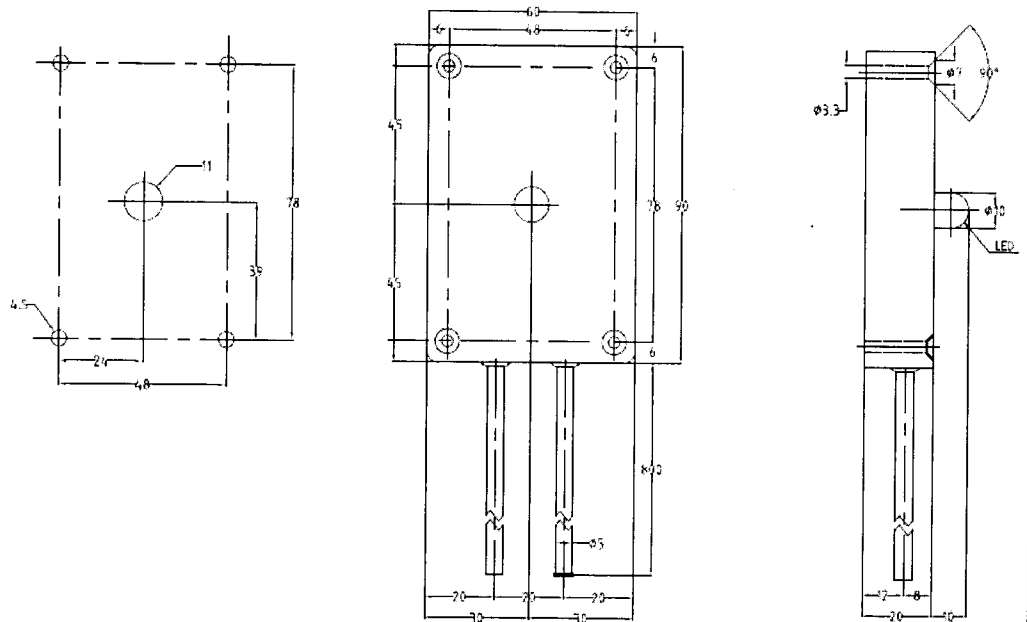
The PCB should be encapsulated in an housing made of Polyamide 6 with Glass reinforced material confirming to flame class V-0, as per the mechanical dimensions specified

7.2 Termination:

Termination should be done with electron beam irradiated cable of 3.6 kV class with 2.35 meter cable length (ex. Huber+Suhner AG Radox 9 GKW-AX)

8.0 MECHANICAL DIMENSION LIMITATION

The High voltage indicator dimensions (overall & mounting) shall not exceed the dimensions indicated in the below sketch. This sketch is given for guidance only for limiting dimensions



Supplier to prepare detailed drawing & submit to BHEL for approval before commencing manufacturing process

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SPECIFICATION FOR HIGH VOLTAGE INDICATOR

9.0 TESTS TO BE CONDUCTED AT SUPPLIER'S WORKSPACE

High Voltage Indicator		
Name of the test	Type test	Routine test
Visual Inspection	Yes	Yes
Performance test	Yes	Yes
Hot operation test	Yes	No
Dielectric test	Yes	Yes
Electrical endurance test	Yes	No

9.1 Visual Inspection

Check of dimensions as per drawing.

9.2 Performance test

The Visual LED Indicator shall be checked at the minimum and maximum rated voltages (AC & DC) and the frequency of flashes noted to be within the specified limits.

9.3 Hot operation test

The test 9.2 shall be repeated at the maximum ambient temperature.

9.4 Dielectric test

A test voltage of 2 kV rms at power frequency for 1 minute shall be applied between the input terminals shorted and earth.

9.5 Electrical endurance test

The Visual LED Indicator shall be subject to the maximum rated voltage and kept on for 168 hours and test 9.2 shall be repeated at the end

10.0 TEST PROTOCOL

Supplier shall submit test protocol for Routine & Type tests along with techno-commercial offer. List of tests are as per clause 5.0 of this specification.

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SPECIFICATION FOR HIGH VOLTAGE INDICATOR**11.0 DOCUMENTATION**

- 11.1 Information required along with techno commercial offer without which offer is liable for rejection.
- 11.2 Supplier shall furnish clause wise confirmation/comments to the technical specification in the typical format given below. Deviation, if any, shall be clearly brought out indicating the clause number, original specification, deviation sought with proper technical backup (catalogue, technical brochure, international standards, calculations etc. If no deviations required, then supplier shall furnish certificate indicating "NO DEVIATION REQUESTED" and we comply fully with all the technical requirements of this specification no.
- 11.3 Supplier shall take a copy of this specification and sign on each page and submit the signed copy along with offer.
- 11.4 Supplier shall furnish winding material, winding resistance, winding cross section.
- 11.5 Supplier shall furnish the type of core used along with technical details of core.
- 11.6 Information required after the placement of order
- 11.7 Detailed dimensional drawing for BHEL approval
- 11.8 Test protocol for BHEL approval.
- 11.9 Information required along with material supply.
- 11.10 Two sets of Test certificates.
- 11.11 BHEL engineer witnessed Pre inspection report.

12.0 ACCEPTANCE

- 12.1 Dimensions as per approved drawing
- 12.2 Routine test certificate
- 12.3 Type test certificate

13.0 PRE-SHIPMENT INSPECTION

Pre-shipment inspection will be carried out by BHEL engineer as per the approved test protocol. BHEL engineers will witness Routine & Type tests before dispatch.

14.0 RATING PLATE DETAILS

- 14.1 BHEL Specification No.
- 14.2 Input voltage range
- 14.3 Serial number
- 14.4 Month & Year of Manufacture
- 14.5 Manufacturer Name

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