

SPECIFICATION

FOR

LED TYPE LOAD AMMETER

FOR DIESEL ELECTRIC LOCOMOTIVES

NOTE:-

- Enclosures :**
1. Load ammeter drawing- 37188801005
 2. Outline of Load Ammeter- 37189114004
 3. Dial Plate Drawing 37189114003

Rev	Date	Prepared	Rev	Date	Prepared	Rev	Date	Prepared
01	26/08/11	Approved			Approved			Approved
Clause No. 2.2(a) and 2.6(a) are modified.								

Rev	Date	Prepared	Rev	Date	Prepared	Rev	Date	Prepared
		Approved			Approved			Approved

Prepared by :			Checked by :			Approved by :		
Distribution	:	Loco Production	Loco PPC	Loco QC	Tech.	CQX		
		(001)	(002)	(003)	(004)	(005)		



PDF
Complete

*Your Special Edition
complimentary
use period has ended.
Thank you for using
PDF Complete.*

[Click Here to upgrade to
Unlimited Pages and Expanded Features](#)

ENGINEERING DEPTT. TION SHEET

LME/ PUR/303
Rev. No :- 01
Sheet No. : 2 of 9

CHAPTER 1- GENERAL

1.1. Objective and scope

At present moving iron/moving coil type Analog Load ammeters are being used in the BHEL make Diesel Electric Locomotives for Load current display on driver desk. These types of meters are having inherent problems of limited resolution, parallax, non-liner scale, zero-drift & sensitiveness to external magnetic fields. These types of meters are having accuracy of the order of 1.5% of full scale deflection. Nowadays, technology of LED bar graph type load ammeters is available and besides giving a better aesthetic look, these type of meters are far more accurate and do not suffer from the inherent limited resolution, parallax, non -liner scale, zero-drift & sensitiveness to external magnetic fields. Purpose of this specification is to develop bar graph type LED Electronic Load Ammeters for Diesel Electric Locomotives.

This specification covers basic feature, broad technical requirements, routine/type/test acceptance tests of Bar graph type LED based Electronic Load Ammeters for Diesel Electric Locomotives. It is the responsibility of the manufacturer/supplier to develop circuit/detail design to meet the requirements of this specification.

1.2. Supplier s Responsibility:

The supplier's responsibility will extend to the following:

- Supply of detailed instructions for installation of the equipment on the locomotive. Supplier shall also depute his representative for ensuring correct Installation of first two equipments at BHEL works.
- Supplier shall arrange Commissioning, testing & field trials of the prototype equipment in service jointly with BHEL.
- LED based Ammeter unit is required to service a life of 10 years. The supplier shall quote separately for spares, which may be required for satisfactory maintenance of the unit for a period of 3 years after completion of warranty period.
- The supplier will be required to enter into a contract with BHEL for repair of electronic cards employed (if any) and shall indicate repair charges for the cards. The repaired card will have warranty of one year.
- The design shall be developed as per requirement given in the specification. The detailed design and OGA drgs shall be submitted to BHEL for scrutiny and approval of the design features before commencing of the manufacturing. BHEL approval of the design does not absolve supplier's responsibility for satisfactory performance of complete system.

The supplier shall be responsible for carrying out all the modifications at his own cost on any part of the equipment during the period of warranty required for satisfactory operation of

Prepared By

Checked By

Approved By

the equipment as per technical specification. For any technical matter the final authority is of BHEL. Modification, if any required on the basis of the experience gained during the field trials of prototype equipment, shall be incorporated by the suppliers without any extra cost. Such modification shall be finalized in consultation with BHEL.

- 1.3. Warranty:** The supplier shall be responsible for any damage to equipment provided in the locomotive due to defective design, materials, and workmanship up to a period of 18 months after commissioning on the locomotive or 24 months from the date of supply, whichever is earlier. The supplier shall replace within one month, such equipment during the warranty period at his cost. The period of warranty will be extendable in case of recurring problems attributable to defective design, material or manufacturing. The supplier's liability in this respect of any complaints, defects and /or claim shall be limited to the furnishing and installation of replacement parts free of any charge.

1.4. BHEL Responsibility:

- a) The installation of LED based Load Ammeter units on locomotives and connections. Interconnecting cables shall be supplied by BHEL.

1.5. Documents to be submitted with the Offer :

The tendered shall submit the following information with the offer in printed form and digital format and compiled in a booklet. Offer with incomplete information may not be considered.

- a) System design, Salient features and advantages of the offered system, Schematic Circuit, Functional Description, Protection scheme.
- b) BOM (Bill Of Material), Data sheets for components/devices and other equipment proposed for use.
- c) Mechanical interface diagram (Outline General Arrangement), assembly drawings of complete unit, mounting arrangement and weight.
- d) Clause by clause compliance.

1.6. Documents to be submitted after getting Order:

- a) Electrical scheme/ wiring and data sheets
- b) OGA drg of the unit with mounting details
- c) Operation and Maintenance manual.
- d) Spares catalogue

1.7. Prototype approval and permission for bulk manufacturing:

- a) The successful tenderer shall submit a prototype sample for inspection/testing and approval by BHEL before undertaking the bulk manufacture. A copy of internal test results should accompany the inspection call.

Prepared By

Checked By

Approved By

- b) The supplier shall undertake bulk manufacturing incorporating modifications Improvements as may be considered necessary in course of service trials.
- c) Any deviations to this specification considered necessary to improve performance reliability of the unit or for any other reason, should be furnished by tenderer with details and fill particulars for consideration of purchaser. Unless such deviations are accepted in final contract, the provision of this specification will be binding on the contractor.

CHAPTER 2 TECHNICAL REQUIREMENT

2.1. The motor current shall be displayed with help of colored LEDs according the specified ranges of each segment such as GREEN, YELLOW & RED. Vendor shall strictly follow the colored range defined in respective drgs. Each cab shall be provided with Two Nos. LED based Load Ammeter units. This unit must have the highest reliability under severe environmental conditions of operation of locomotives i.e., dust, humidity, high ambient temperature, shocks and vibrations, electrical switching surges, Electrostatic Discharge, variations in supply voltage etc.

2.2. The unit shall comprise of following:

- a) LED based Load Ammeter: Consisting of high intensity LED lamp assembly with its zero error adjustment regulators, window toughened front glass. Mounting of this unit shall be generally as per Drg. No. 3 718 88 01 005 Rev-03 (Enclosed as Annexure-01).
- b) Nominal system Voltage used in BHEL locos:

System Voltage

	Type-01	Type-02
Maximum	32VDC	78VDC
Nominal (with charging)	27VDC	72VDC
Minimum	18VDC	55VDC
Battery Voltage	24VDC	64VDC

- c) The mechanical body of the lamp unit should be water proof sealed housing.

2.3. Reverse Polarity Protection: This unit should also have a reverse Polarity Protection in both LED and Ammeter.

Prepared By

Checked By

Approved By

2.4. Compliance with National Standards: The Load ammeter to be supplied against this purchase specification shall be complied with BS89 and IS1248.

2.5. Deviations: Any deviation from the standard lay down with a view to improve the performance, utility, efficiency and reliability may be furnished along with the offer with proper justification.

2.6. Reference Drawing/ details

a) Different type of Load Ammeter used on Diesel Electric shunting Locomotives shall be as per details give below:-

Sr. No.	Model No.	Type of loco	Outline Drawing	Dial Plate Marking Drawing	Shunt Used (BHEL Scope)	System Voltage
1	A.	350HP/700HP TPP DESL	37188801005 Rev.03	37188801005 Rev.03	1500A / 75mv	Type-01
2	B.	700HP SPP DESL	37188801005 Rev.03	37188801005 Rev.03	1500A / 75mv	Type-02
3	C.	1400HP DESL	37189114004 Rev 00	37189114003 Rev00	1500A / 75mv	Type-02

b) Technical details of the Load Ammeters are as under :-

1.	Outline of Load ammeter	As per drawing mentioned in clause no.2.6.a of this specification for different type of locomotive
2.	Dial Plate	As mentioned in clause no. 2.6.a of this specification for different type of locomotive.
3.	Full Scale Deflection	As marked on dial plate for different type of locomotive.
4.	Scale	240 Degree
5.	Accuracy	+/- 2 % of FSD

2.7. Shielding: To be calibrated with reference to 1.6mm thick sheet steel panel. Suitable mounting rubber gasket to be supplied.

Prepared By

Checked By

Approved By

CHAPTER 3 CLIMATIC AND ENVIORMENTAL CONDITION

3.1. LED based Load Ammeter units will be fitted in locomotive cab where the temperature shall be:

- a) Maximum temperature : +70° C
- b) Minimum temperature : 0° C
- c) Average temperature : 70° C

3.2. Humidity: The equipment should design to work at relative humidity of 100% (Saturation).

3.3. Altitude: The locomotive will be working in altitude up to maximum of 1000meters above sea level.

3.4. Rainfall: Very heavy in certain areas. The loco equipment shall be designed suitably.

3.5. Environment: Extremely dusty and desert terrain in certain areas. The dust concentration in air may reach a high value of 1.6 mg/cm³ In many iron ore and coalmine areas, the dust concentration is very high affecting the filter and air ventilation system.

3.6. Coastal area: The equipment shall be designed to work In coastal area in humidity and salt laden and corrosive atmosphere. The maximum values of the condition v.~11 be as follows:

- a. Maximum pH value : 8.5.
- b. Sulphate : 7 mg per liter.
- c. Max. Concentration of chlorine: 6 mg per liter.
- d. Maximum conductivity : 130 micro siemens /cm

3.7. Shocks and Vibrations: During normal working of the locomotive the equipment will be subjected to vibration and buffing shocks as indicated below:

- Vertical acceleration - 1.0g Maximum
- Lateral Acceleration - 0.5g Maximum
- Longitudinal Acceleration - 3.0g Maximum

CHAPTER 4 SCOPE OF SUPPLY

4.1 1 no LED bar graph type Load Ammeter with mounting accessories and rubber gasket as required

4.2 3 sets of operation and maintenance manual

4.3 3set of Spare Catalogue

Prepared By

Checked By

Approved By

4.4 Installation Drawings.

CHAPTER 5 INSPECTION

- 5.1. Inspection of Load Ammeter shall be conducted by BHEL or its authorized representative at supplier works.
- 5.2. Supplier should give inspection call at least 15 days in advance for inspection of the equipment.
- 5.3. All components or fittings used in the construction of the equipment may also be inspected by the BHEL Inspecting officer at final assembly stage .
- 5.4. The inspecting officer shall have authority to :-
- a) Adopt any means of consideration necessary to insure that all the materials or fittings specified are actually used throughout the construction.
 - b) Visit without any previous notice, either at manufacturer's works or his sub-contractor's works to inspect the quality of the work at any stage.
 - c) Reject any materials or fittings that does not conform to the relevant standard specifications.
 - d) Select any equipments / fittings from the lot for test purpose and tests shall be conducted in his presence.
- 5.5. No material shall be dispatched without clearance by the Inspecting Officer.
- 5.6. If any part requires alteration or any defect appears during the test or trial, the manufacturer have to rectify all the defects and alteration to the satisfaction of the Inspecting Officer. No extra cost shall be paid to the manufacture.
- 5.7. Copies of Maker's test, guarantee the performance certificate of the equipment shall be supplied in duplicated along with the dispatch of each set of equipment.

CHAPTER 6 TEST

Following are the type of tests to be carried out on the equipment to be supplied against this specification.

6.1 TYPE TESTS:-

Prepared By

Checked By

Approved By



Type test shall be performed on sample basis to verify the product meets the requirements specified and agreed upon between users and manufacturer. Subject to agreement between user and manufacturer, some or all the type tests shall be repeated once in every 5 years purchaser so as to confirm the consistency of quality of the product. Besides this, Type tests shall be repeated in following cases

- Modification of equipment, which is likely to affect its function
- Failure or variations established during type or routine test and unsatisfactory performance during service.
- Resumption of production after an interruption of more than two years
- At the time of indigenization, if the firm has supplied the product with foreign collaboration

6.2 ROUTINE TESTS

Routine tests shall be carried out on all equipments of each order.

6.3 ACCEPTANCE TESTS

Acceptance Test shall be carried out on 10% of batch quantity subject to minimum of 4 units.

6.4 TEST DETAILS:

The tests to be carried out on complete unit are given in the following table. Type and routine test schemes shall be prepared in accordance with the relevant specifications and furnished to BHEL for approval. Type test will be conducted on the basis of the approved type test scheme in the presence of BHEL representative. However, any additional test, if felt necessary may also be conducted at the time of type test. Manufacturer will bear the expenses of the tests

SL No.	TEST	Spec	TYPE	ROUTINE	Acceptance
1	Visual inspection	IEC 61747	V	V	V
2	Tolerance & Dimension		V	V	V
3	Insulation Resistance	IEC 60571	V	V	V
4	Dielectric		V	V	V
5	Vibration and shock	IEC 61373	V		
6	Performance test	IEC 60571	V	V	

Prepared By

Checked By

Approved By

	by fault simulation				
7	Voltage Surge	IEC 60571.1	V		
8	Electrostatic Discharge Test	IEC 60 571.1	V		
9	Transient burst susceptibility test	IEC 60571.1	V		
10	Radio interference test	IEC 60571.1	V		
11	Damp heat	IEC 60571.1	V		
12	Dry heat up to 80 degree C	IEC 60571.1	V		
13	Functional Test	As per test program to be finalized during design approval stage	V	V	V
14	Test for protection against dust and water	IEC 60529 clause 13 and 14	V		
16	Electromagnetic compatibility	IEC 62236-3-2 & IEC 62236-2	V		
17	Environmental, Endurance and mechanical test methods - Glass strength and reliability	IEC 61747-5-3 Ed. 1.0 b	V		

V: Implies test to be carried out

The prototype tests shall be witnessed by BHEL at the Factory premises or at mutually agreed venue, where all the facilities shall be made available for carrying out the prototype test. The equipments shall be kept in field trials for a period of 2 months

Prepared By

Checked By

Approved By