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भारत सरकार

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GOVERNMENT OF INDIA
MINISTRY OF RAILWAYS

डीजल इलेक्ट्रिक लोकोमोटिव्स हेतु स्टैन्ड अलोन लो आइडलिंग इक्युपमेंट सिस्टम के लिए विशिष्टि

Specification of Standalone Intelligent Low Idling (ILI) Equipment for E-Type Diesel Electric Locomotives (Alco)

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1.0 PREAMBLE

Low idle (350 rpm) modification requires to be implemented on all locomotives as per decision taken in the 32nd DMG. Guidelines for implementation of low idle feature on 2600 Hp / 3100 HP locomotives had been issued by RDSO in the past through modification sheets nos. MP.MOD.EN.03.11.00 dated 21.2.2000 and MP.EC.Mod-1, Rev.0.00, dated 27.09.99 respectively.

The issue was again discussed in 38th DMG and instructions were reiterated for implementing low idle modification on locomotives fitted with Woodward governor. However, the provision of low idle feature on diesel locomotives has not been done to the extent expected due to apprehension of diesel sheds in respect of engine shutting down due to low lube oil pressure. Therefore, need was felt to provide an alternative scheme which would take care of this problem.

In addition modifications in Lube oil pump in recent past have also improved the lube oil pressure obtained on the diesel locomotives. The feature of low idling has already started implementing in locomotives with M/s Medha microprocessor and MCBG.

This specification is being prepared to develop an ILI system for non microprocessor locomotives, which can serve the purpose of bringing the locomotive to low idling (fitted with W.W. Governor) after ensuring stability of certain parameters.

2.0 DEFINITIONS OF TERMS

The following terms and abbreviations are used throughout the specifications.

ILI	Intelligent Low Idling System
LOPS	Low Lube Oil Pressure Shutdown
LOP	Lube Oil Pressure
MU	Multiple Unit
IEC	International Electro-technical Commission
IS	Indian Standard.
IR	Indian Railways
AAR	Association of American Rail-roads.
UIC	Union International Des Chemins defer (International Union of Railways)
EMI	Electro Magnetic Induction
RDSO	Research Design and Standards Organisation

3.0 SCOPE

This specification covers design, manufacture ILI (Intelligent Low Idling) Equipment for 2600 Hp/3100 HP non- microprocessor Diesel Electric locomotives fitted with Wood Ward Governor.

4.0 TECHNICAL REQUIREMENTS

- The ILI systems are intended to be installed on Diesel Electric locomotives fitted with E type excitation system and Woodward Governor to decrease fuel consumption during idle running of the locomotives. This system will bring the locomotive to low idle RPM of 350 after ensuring that

(a) locomotive starts at normal idle RPM of 400 (idle notch) and runs at this RPM

(b) lube oil pressure is 1.7 kg/cm^2 or more

(c) These conditions remain stable for 5 minutes.

- LOPS setting at idle (400 rpm) shall be 1.7 kg/cm^2. During low idling, if LOP reduces below 1.2 kg/cm^2, system will revert back to 400 RPM idle speed. The LOPS setting at low idle (350 rpm) shall be 1.1 Kg/cm^2.
- The proposed low idling system should be reliable & proven for the intended application
- The function of this system shall automatically get bypassed in conditions such as notching up, switching on GF and dynamic braking. One isolation switch should be provided in ILI control unit to isolate the low idle RPM feature in case of any trouble experienced in the circuit.
- When the engine is at low idle RPM, pressing the “Stop Button” should stop the engine.
- This system should execute all functions, even when locomotives are running in MU.
- Two LED indications for “status of low idle” and “Power supply” shall be provided.
- There should be facility of downloading data of low idling equipment with the help of laptop or by a hand held battery operated portable device (optional). The data will include total nos. of low idling counts and total idling time along with date and time stamp. It should be possible to view entire log of low idle events with date and time stamp on a standard PC or Laptop.
- The system should not require any changes in wiring/schematic of the Locomotive.
- The LOP settings, LOPS setting, Low idle delay time and real time clock setting should be user settable.
- Data downloading from the ILI unit should be password protected to avoid erasing of data by an unauthorised person.

4.1 CONTROL UNIT:

- Storage of minimum 1000 low idle events with date and time stamp.
- Fail safe design with feature of self isolation in case of malfunctioning.
- Should be of Cast aluminium or equivalent material coated with chromate for EMI shield.

- Modular system.

4.2 OUTPUT

- High rated contacts for digital output (2 Amps 72VDC) continuous.
- Visual indication of self-status.

5.0 SCOPE OF SUPPLY

- ILI unit 01 No.
- Pressure Sensor Input Range (0-10 Bar) 01 No.
- Configuration and Logger software in CD/pen drive 01 No.

6.0 DEVIATIONS

Any deviations from standards laid down with a view to improve the performance of the equipment may be given due consideration provided full particulars with justification thereof, shall be furnished by the manufacturer and prior approval of RDSO should be obtained.

7.0 SERVICE CONDITIONS

The equipments covered in this specification shall be suitable for operation under following conditions:

Maximum temperature (Atmospheric)	(i) 70 ºC (under sun). (ii) 47 ºC (in shade) (Temperature inside locomotive may reach up to 60 ºC.)
Minimum temperature (Atmospheric)	- 5 ºC.
Humidity	90 % (Up to 100% during rainy season as per IEC 60721-3-5.
Altitude	Max. 1200 meter above mean sea level
Reference site conditions	(i) Ambient temp. 47 ºC (ii) Temp. inside engine compartment 55 ºC (iii) Altitude 160 m.
Annual rainfall	Between 1750 mm to 6250 mm. The locomotive shall be designed to permit its running at 5 Km/h in flood water level of 10.2 cm above the rail level.
Dust	Extremely dusty and desert terrain in certain areas. The dust content in air may reach as high a value as 1.6 mg / m^3.
Atmospheric conditions in coastal areas in humidity salt laden and corrosive atmosphere	All the equipments shall be designed to work in coastal areas in humid, salt laden and corrosive atmosphere. (a) Maximum PH value: 8.5 (b) Sulphate: 7 mg / liter. (c) Max. concentration of chlorine: 6 mg / liter (d) Maximum conductivity: 130 micro siemens / CM.

7.2 The equipment and its mounting arrangement shall be of robust design for traction duty and withstand satisfactorily the vibrations and shocks normally encountered in service. The equipment shall be so designed and constructed that mechanical shock or external vibration shall not operate or damage it. The vibration, shock and bump test shall be subjected to the tests defined in IEC 61373 (as per clause 10.2.11 of IEC 60571).

7.3 **RATING**

Rated Voltage	72V DC
Nominal Operating Voltage	50 – 80V DC

8.0 DEFINITIONS

Type Tests: Tests carried out on prototype control system equipment and associated equipments to prove conformity with requirements of this specification.

Routine Tests: Tests carried out on each set of control equipment to check the requirements, which are likely to vary during production.

9.0 ACCEPTANCE

9.1 TYPE AND ROUTINE TESTS

Type and routine test schemes shall be prepared in accordance with the relevant IEC/UIC/IS/AAR specifications and furnished to RDSO for approval. A list of tests to be carried out during type testing is given below. Prototype test shall be conducted on the basis of the approved type test scheme in the presence of the RDSO representative.

SN	Clause No.	Details of test
1.	10.2.1 of IEC 60571	Visual inspection
2.	10.2.2 of IEC 60571	Performance test, reverse polarity test, Effect of voltage variation test
3.	10.2.3 of IEC 60571	Cooling test
4.	10.2.4 of IEC 60571	Dry heat test
5.	10.2.5 of IEC 60571	Damp heat test
6.	10.2.6 of IEC 60571	Electro static discharge test
7.	10.2.7 of IEC 60571	Transient Burst Susceptibility test
8.	10.2.8 of IEC 60571	Radio Interference test
9.	10.2.9 of IEC 60571	Insulation test
10.	10.2.10 of IEC 60571	Salt Mist test
11.	10.2.11 of IEC 60571	Vibration and shock test

Routine test shall be conducted on the basis of the approved routine test scheme in the presence of IR representative and the test results shall be submitted to RDSO for scrutiny and approval.

The above testing requirement can be waived off only in case of reputed suppliers with ample experience of development of similar ILI systems for Railway applications. However, a copy of the type and routine test reports conducted earlier by the supplier shall be submitted for scrutiny and approval.

9.2 TEST SCHEME

Sr. No.	Description of Tests	Type Test	Routine Test	Validation Test
1.	Visual inspection	Yes	Yes	Yes
2.	Performance test	Yes	Yes	Yes
3.	IR Test	Yes	Yes	-
4.	Hi Pot Test	Yes	Yes	-
5.	Reverse polarity test	Yes	Yes	-
6.	Effect of voltage variation test	Yes	-	-
7.	Electro static discharge test	Yes	-	-
8.	Dry heat test	Yes	-	-
9.	Damp heat test	Yes	-	-
10.	Transient Burst Susceptibility test	Yes	-	-
11.	Radio Interference test	Yes	-	-
12.	Salt Mist test	Yes	-	-
13.	Vibration and shock test	Yes	-	-
14.	complete performance establishment	-	-	Yes

9.3 VALIDATION TEST

Validation tests shall be carried out on a D.E locomotive at any nominated place mentioned by IR to establish the performance capability of ILI system. Special instrumentation if required shall be provided by the supplier. The supplier shall submit details of the tests proposed for validation testing.

9.4 EMI/EMC tests to be conducted on Electronic equipments are given below:

The electronic equipments shall be tested for the immunity to types of transient disturbances such as those originating from switching transients (interruption of inductive loads, relay contact bounce, etc.).

The acceptable test level shall be 2 as specified in clause 5 of IEC 1000-4-4: 1995. There shall be no degradation of performance allowed during or after the test.

10.0 FIELD TRIALS

One or two prototype of the equipment as decided by IR shall be subjected to field trials for six months before clearance is given for bulk supply. During this

period, the performance of the equipment shall be closely monitored and evaluated by RDSO. These trials are intended to prove

- Reliability under rigorous environmental and operating conditions
- Advantages for locomotive operation and maintenance
- Maintainability of the equipment.

Modifications found necessary as a result of the tests / the supplier at his own cost shall carry out trials after the relevant modifications have been approved by RDSO.

11.0 SAFETY RELATED MODIFICATION

During implementation of ILI, any safety related modifications issued by IR are to be carried out by the tenderer.

12.0 WARRANTY AND SERVICE SUPPORT

12.1 The contractor shall guarantee the equipment against design and manufacturing defects for a period of two years from the date of commissioning. Notwithstanding anything that may be specified in this specification, the final responsibility for the suitability of the design shall lie with the contractor who shall undertake to carry out all modifications and alterations to equipment supplied by them for satisfactory functioning in accordance with this specification as may be necessary during the period of two years.
When the equipment is taken in hand for installation at a nominated shed/workshop/production unit, the contractor shall be responsible for providing all necessary service support and guidance for satisfactory installation and commissioning.

12.2 AFTER-SALE SERVICE

Service support should be provided to diesel sheds where such equipment is installed at the shortest notice. It shall be the responsibility of the supplier for satisfactory operation of the equipment.

Indian Railway Maintenance Staff shall be associated with the supplier's engineer for maintenance and operation.

12.3 If the tenderer does not have adequate service support, his offer will be liable for rejection.

13.0 PACKAGING

- The component packing must be in assembled form of all the sub-assemblies. The packing list must totally match the complete BOM to be given by the supplier and this match shall be clearly indicated in the documents accompanying the supply.

- All sub assemblies shall be suitably packed to prevent any transit damage. It shall be in line with the standard Indian Railways packing instruction.

14.0 MAINTENANCE SCHEDULE REQUIREMENTS

Drawings

General outline dimensional drawing of the equipment and its mounting arrangement shall be furnished by the tenderer. Details of the contacts, electrical connection and interfacing diagram shall also be included.

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