



GOVERNMENT OF INDIA

MINISTRY OF RAILWAYS

TECHNICAL SPECIFICATION OF  
WINDSCREEN DEFOGGER  
FOR DIESEL LOCOMOTIVES

SPECIFICATION NO. MP 0.01.00.29

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RESEARCH DESIGNS & STANDARDS ORGANISATION

LUCKNOW - 226 011

*Cost (Rs).....*

## Technical Specification of Windscreen Defogger for Diesel Locomotives

### 1. INTRODUCTION

The Windscreen Defogger prevents the fogging of windscreen in rainy and winter seasons by heat generation by a clear resistive film, which is pasted on the windscreen, thus maintaining the clearness of the windscreen.

### 2. SCOPE

This specification covers the purchase, inspection, testing, acceptance and technical requirements of the "Windscreen Defogger" for use in Diesel locomotives of Indian Railways.

### 3. DEFINITIONS, ABBREVIATIONS AND CLARIFICATIONS

- 3.1 Tenderer means firm/company from whom the offer for the supply of Windscreen Defogger is invited.
- 3.2 Supplier means the present firm/company on whom the order for the supply of the Windscreen Defogger is placed/will be placed.
- 3.3 Purchaser means the Indian Railways on behalf of the president of the Republic of India who are purchasing the Windscreen Defogger.
- 3.4 Inspecting Authority means the organisation or its representative nominated by the purchaser to inspect the Windscreen Defogger on his behalf.
- 3.5 The Research Designs and Standards Organization, Manak Nagar, Lucknow-226011 is hereafter referred to as RDSO.
- 3.6 Indian Railways is hereafter referred to as IR.
- 3.7 In case of tenderer needs any clarification in respect of any clause of this specification or regarding the drawings the tenderer shall obtain it from Motive Power Directorate, RDSO for clarification.

### 4 CLIMATIC AND ENVIRONMENTAL CONDITIONS OF OPERATION

- 4.1 Altitude: Mean sea level to an altitude of 1000 meters above mean sea level.
- 4.2 Temperature: 0° C to 55° C. The air temperature around equipment may reach as high as 70° C inside the compartment of locomotive.
- 4.3 Relative Humidity: Up to 100%.
- 4.4 Operating Voltage: The Windscreen Defogger, shall be suitable for 72 volts DC on diesel locomotives application. The voltage variation on diesel locomotive may be between 48 to 90 Volts. Supplier will include protection against sudden variation in voltage like surge in Windscreen Defogger design itself.
- 4.5 Other Conditions: Equipment shall be capable of operating efficiently in spite of dirt, dust, mist, torrential rain, coastal areas, heavy sand or stone storms and presence of oil vapours and radiant heat etc. to which the rolling stock is normally exposed in service.

## **5 WARRANTY**

The equipment shall work satisfactorily for a period of 30 months from the time of supply or 24 months from time of fitment on locomotive, whichever is earlier. Any equipment which fails during the warranty period shall be replaced or modified free of cost by the supplier. In case it becomes necessary to modify the design, all the units will have to be modified by the supplier free of cost.

## **6 AFTER SALES**

6.1 Supplier shall arrange to supply along with the equipment, one maintenance manual of the equipment with supply of every 5 sets. Manual shall contain information pertaining to detailed dimensional drawings indicating mounting arrangement layout, sub assemblies, principle of operation, maintenance schedules, trouble shooting, and details of special tools if required, parts catalogue and testing procedure of the equipment being supplied. Updated position of modifications will also be incorporated.

6.2 Adequate number of coloured wall charts showing pictorial view of components along with part nos. will be given. The copies of Maintenance Manual and wall charts are meant for wider circulation for Railways and fresh copies shall be furnished as stipulated even if there are no changes in the manual and wall charts furnished against earlier contract.

## **7 QUALITY AUDIT**

Periodical Quality audit will be carried out by RDSO to ascertain that procedure of manufacturing, inspection and testing of the equipment is being done by the firm as per the approved QAP.

## **8 APPROVAL OF DRAWING AND TEST PROCEDURE**

At the time of prototype development the supplier will get the provisional approval of designs & drawing and testing procedure of equipment from Motive Power Directorate of RDSO. Test procedure of the equipment shall cover general performance requirement of the equipment, which are essential for satisfactory working of equipment for which it is designed and its reliability in service. After prototype development, testing and fitment on locomotive, the drawing(s) will be approved by RDSO. The firm will modify the drawings/test procedure in consultation with RDSO, if required, based on field performance on locomotives in Railways.

## **9 TECHNICAL REQUIRMENTS**

9.1 Windscreen Defogger should be of modular design and It should be easily mounted and dismounted on locomotive. Windscreen Defogger should prevent the fogging of the windscreen, should provide efficient heating, UV protection and should be abrasion resistant.

9.2 The control to operate the Windscreen Defogger should be provided on both the driver control stands such that it is approachable to the driver during normal train operation.

9.3 Windscreen size and power rating should be as follows:

	<b>Application</b>	<b>Dimension of Film (mm)</b>	<b>Voltage</b>	<b>Amperage</b>	<b>Power Watts</b>
1.	Front windscreen for EMD locos	990 x 533	72 VDC	2.2	164
2.	Windscreen towards long hood for EMD locos	355 x 660	72 VDC	1.3	96
3.	Windscreen for ALCO locos	355 x 660	72 VDC	1.3	96

9.4 The Windscreen Defogger shall be provided with an arrangement by the tenderer through which it can be isolated in case it becomes defective/malfunctions.

9.5 The Windscreen Defogger shall be Compatible with other equipments fitted on the same locomotive without affecting the functioning of each other.

9.6 Optical Details:

	<b>Description</b>	<b>Standard</b>
1.	Total Visible Transmittance	85%
2.	Total Visible Reflectance	13%
3.	Transmittance Haze	1%
4.	Transmittance Colour	2 YID

9.7 Film Details:

- i. Thickness: 7mils
- ii. It should be hard coated to minimize scratching.
- iii. It should be heat stabilized.
- iv. It should be UV coated to prevent yellowing or fading.

9.8 It should automatically cut off, after clearness of the windscreen during winter seasons.

## **10 INSPECTION, TESTING AND FIELD TRIAL**

10.1 **Prototype Inspection (Type Test):**

10.1.1 Prototype unit will be subjected to endurance test for 24 hours duration and vibration test for 12 hour duration on test bench.

10.1.2 Electronic equipment used in the system shall be tested in accordance with IEC-60571. These tests as per relevant clause of IEC-60571 shall be carried out for prototype only. A certificate from recognised testing laboratory shall be considered satisfactory for this purpose.

10.1.3 **Test procedure of functionality test:** Functional test should be conducted either on a test bench or on locomotive. Mount the Windscreen defogger on the test rack or locomotive. Conduct the test as per the test procedure given as follows:

Description	Standard value
<b>Functional Test:</b>	
Simulate the atmospheric conditions so that fogging of the wind screen takes place, then start the Wind screen defogger	After 5 min., Wind Screen should be defogged & following parameters should be met: Total Visible Transmittance: 85% Total Visible Reflectance: 13% Transmittance Haze: 1% Trnsmittance colour: 2 YID

10.1.4 Field Trial of Windscreen Defogger on Locomotives

The performance of the Windscreen Defoggers in field will be monitored for at least six months. Prototype should give satisfactory results in field.

## 10.2 Developmental inspection

- 10.2.1 The Windscreen Defogger shall be offered for stages & final inspection for approval. Any change in design found necessary during inspection shall be carried out by the contractor free of cost to ensure satisfactory performance of the Windscreen Defogger.
- 10.2.2 The inspection of the Windscreen Defogger shall be carried out by Motive Power Directorate of RDSO during developmental stage, at the contractor's premises during the manufacture and before despatch. Timely intimation (at least 2 weeks notice) should be given to the inspecting authorities.
- 10.2.3 The contractor shall provide without extra charge, all material equipment tools, labour for tests of every kind, which the purchaser or his nominee shall require to be made on the contractor's premises. The contractor shall also provide any other assistance, which the inspecting authority may consider necessary for any test, examination and dimensional checking.
- 10.2.4 At the time of inspection the supplier shall submit the internal test results necessary to prove that the Windscreen Defogger fulfils the technical requirements conforming to RDSO Specification.
- 10.2.5 If endurance test for components and sub-assemblies is required by RDSO, Lucknow, the contractor will create facilities in his works for the same.
- 10.2.6 After inspection of the Windscreen Defogger, it will be subjected for field trials to monitor its performance on locomotive. Performance during field trials will be monitored at least for six months before giving final approval.

### 10.3 Regular Inspection

10.2.7 Regular inspection of the Windscreen Defogger shall be carried out by the purchaser or his nominee. The supplier shall provide, without extra charges, for material, equipment, tools and any other assistance, which the purchaser or his nominee may consider necessary for any test and examination. The supplier shall make available manufacturing drawings and material specifications of the components to the inspecting authority at the time of inspection.

10.2.8 Supplier will offer Windscreen Defogger for inspection after complete checking by them. The test results of every Windscreen Defogger will be submitted to the inspecting authority. Inspecting authority shall carry out all tests necessary to prove that the Windscreen Defogger fulfils the technical requirements, covered in this specification.

10.2.9 Sample Size

Sample size for various tests is given below:

Lot size	Sample size	Number of rejection acceptable
Upto 25	3	0
25-50	5	0
50-75	8	0
75-100	10	0
More than 100	10% of the lot	0

Samples should be picked up at random from the lot. If rejection number is more than the acceptable limit, inspection will be stopped and entire lot will be tested again by the firm. After checking the firm will re offer the lot for re-inspection. Again sample checking will be done by the inspecting authority. If second time also rejection is more than the acceptable limit, entire lot will be rejected.

## 11 SCOPE OF SUPPLY

Windscreen Defogger system should include the defogger film and controls required to control the Windscreen Defogger system.

## 12 INSTALLATION:

12.1 Installation and commissioning of the Windscreen Defogger of the first prototype shall be the responsibility of the supplier. Other equipment shall, however, be installed by purchaser. Assistance with regard to labour and other facilities which are available in the workshop would, however, be provided by the purchaser to the supplier. Additional equipment/fittings, not covered in the specification, if required, for installation of Windscreen Defogger, shall be supplied by the supplier.

- 12.2 The supplier shall submit tentative installation drawings along with the offer based on the availability of space in the locomotive. These drawings would, however, be finalised after fitment of the first prototype.

### **13 Technical Documents/Drawings:**

- 13.1 Following documents (5 copies) shall be submitted along with the offer:
- .1 List of equipment with part catalogue numbers and drawing numbers.
  - .2 Technical literature covering design and principle of operation, to have general idea of the Windscreen Defogger offered.
  - .3 Detailed dimensional drawings indicating mounting arrangements, layout of Windscreen Defogger, sub-assemblies etc.
  - .4 Clause wise comments on specification.
  - .5 Test program and details of testing facilities at manufacturer's works.
  - .6 List of recommended spares for maintenance of Windscreen Defogger for two years.
  - .7 List of special tools required for maintenance of Windscreen Defogger.
  - .8 Latest Copy of bill of material of Windscreen Defogger with Drg. No. of individual components.
- 13.2 One copy per five set of the type test and routine test reports shall be supplied by the supplier as part of contract.

### **14 DEVIATIONS:**

- 14.1 In case the offer does not correspond to this specification in any respect a "Deviation Statement" shall be submitted by the Tenderer. This statement shall clearly indicate the deviation CLAUSE-WISE with technical reasons.
- 14.2 The final decision regarding the acceptance of the deviations submitted by the contractor shall be at the discretion of the purchaser.
- 14.3 Clauses not covered in the Deviation Statement shall be deemed to be acceptable to the Tenderer in all respects. In case of Deviation Statement is not submitted it would be taken, as the complete specification is acceptable to the Tenderer.