

MOTORS FOR ELECTRIC POINT MACHINE



**INDIAN RAILWAYS STANDARD SPECIFICATION
FOR
MOTORS FOR ELECTRIC POINT MACHINE**

SPECIFICATION NO. IRS: S 37/1982

**Revision 1.0
With Amendments 1, 2 & 3**

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**SIGNAL DIRECTORATE
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MOTORS FOR ELECTRIC POINT MACHINE		

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MOTORS FOR ELECTRIC POINT MACHINE

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Prepared By: K.C.Bharti
Sr. Section Engineer / Signal

Checked By: R. Sahariya
Asstt. Design Engineer

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AMENDMENTS

Version	Chapter/ Annexure	Amendment	Effective date
IRS: S 37/1970		FIRST ISSUE	1970
IRS: S 37/1982		Revision 1	1982
IRS: S 37/1982		Amendment 1	-
IRS: S 37/1982		Amendment 2	1990
IRS: S 37/1982		Amendment 3	-

Amendments 1, 2 & 3 have been incorporated in the specification.

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MOTORS FOR ELECTRIC POINT MACHINE

**Government of India
MINISTRY OF RAILWAYS
(RAILWAY BOARD)**



सत्यमेव जयते

**INDIAN RAILWAYS STANDARD SPECIFICATION
for
MOTORS FOR ELECTRIC POINT MACHINE**

0. FOREWORD

- 0.1 This specification is issued under the fixed Serial No. S 37; the final number indicates the year of original adoption as standard, or in the event of revision, the year of last revision.

ADOPTED 1970, REVISED 1982

- 0.2 This specification requires reference to the following Indian Railway Standard Specifications (IRS) and Indian Standard Specification (IS) and shall also be complied with to the extent applicable:

IRS : S 23 Electrical Signalling and Interlocking Equipment (Tentative).

IRS : S 24 Non trailable Electric Point Machine with plunger type of locking.

IS : 325 Three phase induction motors.

IS : 1271 Classification of insulating materials for electrical machinery and apparatus on the basis of thermal stability in service.

IS : 2106 Environmental test for electronic and electrical equipment.

IS : 9000 Basic environmental testing procedures for electronic and electrical items.

- 0.3 Whenever reference to any of the above mentioned Specifications appears in this Specification, it shall be taken as a reference to the latest issue of that Specification.

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- 0.4 This specification is intended chiefly to cover the technical provisions and the provisions relating to supply of materials and so does not include all the necessary provisions of a contract.

1. SCOPE

- 1.1 ~~This Specification covers the requirements of 24/36 V de or 110V (de or ac) motors to be used in Electric Point machine.~~

This Specification covers the requirements of 110V, DC motors to be used in Electric Point machine.

-Amendment 3

2. TERMINOLOGY

- 2.1 The Terminology referred to in this specification is covered by the definitions given in IRS Specification S 23 * .
- 2.2 The terms referred to in this Specification but not covered by IRS Specification S 23 * are defined below :
- 2.2.1 Rating: A statement of operating limits assigned to the machine by the Manufacturer.
- 2.2.2 Short Time Rating- A rating which specifies the load at which the motor, starting at the ambient temperature, may be operated for the period and under the conditions specified on the rating plate, while complying with the requirements of this Specification.
- 2.2.3 Over load : Any condition of load in excess of the rated load; usually the amount of the excess is expressed as a percentage excess torque for motors.
- 2.2.4 Momentary over load : An over load the duration of which is so short as not to affect appreciably the temperature of the motor.
- 2.2.5 Totally Enclosed Motor : A motor so constructed as to prevent the free exchange of air between the inside and the outside of the enclosing case. Such as enclosure is not necessarily air tight.

3. MOTOR ENCLOSURE

- 3.1 The motor shall be totally enclosed type.

* Electrical Signalling and Interlocking Equipment (Tentative).

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4. RATED VOLTAGE

- 4.1 ~~The rated voltage of the motor shall be either 24/36V dc or 110V dc or ac single phase 50 Hz as specified by the purchaser.~~

The rated voltage of the motor shall be 110V, DC.

-Amendment 3

5. RATING OF MOTOR

- 5.1 ~~The rating shall be short time, 30 minutes rating.~~

The rating shall be short time, 10 minutes rating.

-Amendment 2

6. OPERATING REQUIREMENTS

- 6.1 ~~The Motor when connected to an Electric Point Machine shall be capable of complying with the Operating Requirements given under Clause 11.6 of IRS : S 24*. It shall also be capable of operating the Point Machine as per IRS : S 24* between the limits of 75 and 125% of the appropriate rated voltage.~~

The Motor when connected to an Electric Point Machine shall be capable of complying with the Operating Requirements given in IRS : S 24*. It shall also be capable of operating the Point Machine as per IRS : S 24* between the limits of 75 and 125% of the rated voltage.

-Amendment 3

7. TYPE OF MOTOR

- 7.1 ~~Motors shall be series wound type with split fields.~~

Motors shall be either permanent magnet type or series wound type with split fields.

-Amendment 3

- 7.2 The insulation for the motor shall be class 'B' in accordance with IS : 1271**.

- 7.3 The motor shall be capable of rotation in both directions.

8. DIMENSIONS

- 8.1 The main dimensions of the motor shall be as specified by the Purchaser (see Appendix-A) and such that it forms an integral part of the Point Machine and can be readily removed therefrom.

* Non-trailable Electric Point Machine with plunger type locking.

** Classification of insulating materials for electrical machinery and apparatus in relation to their thermal stability in service.

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9. CABLE CONNECTION

- 9.1 The cable entry shall be of ample size, conveniently located for access to the terminals and arranged to protect the cable from mechanical injury.

10. BEARING

- 10.1 The bearings shall be such that the lubricants used cannot reach the brushes, commutator or windings.

11. MOMENTARY OVERLOAD

- 11.1 The motors rated in accordance with this standard shall be capable of withstanding on test (under gradual increase of torque) without injury, 60% of the full load torque as over load for 15 seconds after having attained the temperature rise corresponding to the rated load.

- 11.2 ~~During the test, the voltage and the frequency shall be maintained at the rated value.~~

During the test, the voltage shall be maintained at the rated value.

-Amendment 3

12. TEMPERATURE RISE

- 12.1 The temperature rise of motors when tested under rated conditions and in accordance with the requirements of this Specification shall not exceed the limits given in Table-1.

- 12.2 Temperature measurement shall be carried out by any of the methods indicated in clause 22.2.2 of IS : 325*.

- 12.3 At the start of the temperature test of the motor, the temperature of the winding shall be substantially the same as that of cooling air.

- 12.4 ~~The duration of the temperature test shall be 30 minutes.~~

The duration of the temperature test shall be 10 minutes.

-Amendment 2

* Three phase Induction motors.

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TABLE 1**Limits of the temperature rise**

Parts of motor	Temperature rise
(i) Insulated windings	50° C
(ii) Iron parts in contact with insulated windings.	50° C
(iii) Commutators	50° C
(iv) Iron cores and other parts not in contact with insulated windings and uninsulated windings.	The temperature rise shall in no case reach such a value that there is a risk of injury to any insulated materials on adjacent parts.

13. COMMUTATORS, BRUSH GEAR AND SLIP RINGS

- 13.1 The Motor shall work with fixed brush setting from no load to the momentary overload specified in Clause 11.1 without injurious sparking or injury to the Commutator, brushes or slip rings.

14. MARKING AND IDENTIFICATION

- 14.1 Marking and identification shall conform to IRS Specification No. S 23*.
- 14.2 Each motor shall be provided with a rating plate indicating:
- (a) The number of specification
 - (b) Type of motor.
 - (c) Name of the Manufacturer.
 - (d) Manufacturer's Number.
 - (e) Class of rating.
 - (f) Rated voltage or voltage range.
 - (g) Rated output in watts.
 - (h) Approximate current in amperes at rated output.
 - (i) Approximate full load speed in revolutions per minute at rated output.

- 14.3 A wiring diagram of connections shall be supplied mounted inside the cover.

15. TERMINALS

- 15.1 Terminals shall be of size M 6 and shall conform to IRS Specification S 23*.

* Electrical Signalling & Interlocking Equipment (Tentative).

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15.2 Terminals shall be marked for identification purposes in accordance with the diagram of connections.

16. **FINISH**

16.1 The finish of the various parts of the machine shall conform to IRS Specification S 23*.

17. **INSPECTION AND TESTING**

17.1 **Type Tests-**

17.1.1 One sample shall be subjected to type tests mentioned in Clause 17.1.2. The sample should successfully complete these tests and also satisfy the insulation resistance values specified in Clause 19.2. In case of failure, a fresh sample shall be called for and again subjected to these tests.

17.1.2 Type tests shall include all the tests referred to in Clause 17.3 and the following environmental tests in the under mentioned sequence:

- (a) Dry Heat test- (at $85^{\circ}\text{C} \pm 3^{\circ}\text{C}$) for 16 hours as per IS : 9000 (Part –III/Sec 1 to 5).
- (b) Cold test- (Chamber temperature of $-10^{\circ}\text{C} \pm 3^{\circ}$) for 16 hours as per IS: 9000 Part II/Sec. 1 to 4).
- (c) Damp Heat (cycling) test- (one cycle of 24 hours) as per IS: 9000 (Part V/Sec 1 &2).
- (d) Salt Mist test – as per IS : 2106 (Part XVIII).
- (e) Water Spray test- as per IS : 2106 (Part XI).

Notes- (1) After each of the tests mentioned above, it should be checked up that the motor rotates freely when connected electrically. In the case of cold, damp heat, salt mist and water spray tests a recovery period of two hours should be allowed. The voltage should be increased gradually from Zero till the rotation sets in. The voltage should under no case exceed 40% of the rated voltage.

- (2) Insulation resistance values shall be measured after dry heat, cold and damp heat tests. Details of the same may be seen in clause 19.2.

* Electrical Signalling and Interlocking Equipment (Tentative).

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17.2 Routing Tests- These shall be made on every motor manufactured and shall comprise-

- (a) Tests under full load condition of current, power input and speed at rated voltage and frequency.
- (b) Insulation resistance test (Clause 19.1).
- (c) High voltage test (Clause 18).
- (d) A.C. immunity test (Clause 20).
(Applicable to AC immune motors only).

-Amendment 3

17.3 Performance test- Performance test shall be made on 2% of a batch, subject to a minimum of one motor, at the rated voltage and shall comprise-

- (a) Operating requirements (Clause- 6).
- (b) Temperature rise (Clause-12).
- (c) Momentary overload (Clause-11.1).
- (d) Insulation resistance (Clause 19.1).
- (e) High voltage (Clause-18).
- (f) A.C. immunity test (Clause 20).
(Applicable to AC immune motors only).

-Amendment 3

18. HIGH VOLTAGE TEST

18.1 High voltage test shall be conducted as follows-

	Test Voltage	Duration
(1) Between field winding and body with the armature isolated.	2000 Va.c.(r.m.s) at 50 Hz.	1 minute for Type test.
(2) Between armature and body with field isolated.	1000 Va.c.(r.m.s) at 50 Hz.	1 minute for Type test.

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High Voltage Test between field winding and body shall be conducted only in case of series wound motors.

-Amendment 3

- 18.2 Duration of the High Voltage test for routine and performance tests shall be between five and ten seconds.

19. INSULATION RESISTANCE TEST

- 19.1 The insulation resistance shall be measured with a DC voltage of 500 V and the value obtained shall not be less than 10 megohm. For this purpose, the terminals of field and armature windings shall be connected together and the insulation resistance measured between the common terminal and the body. The insulation resistance test shall be carried out before and after high voltage test.

In case of permanent magnet motors, the insulation resistance shall be measured only between the terminals of armature windings and the body.

-Amendment 3

- 19.2 The insulation resistance shall also be measured after the following environmental tests and the values obtained shall not be less than as indicated below-

Name of Tests	Recovery period	I.R. Value between both fields and body with armature isolated	I.R.Value between armature and body with fields isolated.
(1) Dry Heat Test	2 hours	5 megohm	1 megohm
(2) Cold Test	2 „	1 megohm	1 megohm
(3) Damp Heat	2 „	100 kilo-ohm	There shall be no direct shorting.
	48 „	250 kilo-ohm	do
	7 days	1 megohm	1 megohm
	14 days	5 megohm	1 megohm

In case of permanent magnet motors, the insulation resistance shall be measured only between the terminals of armature windings and the body.

-Amendment 3

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20. AC IMMUNITY TEST

- 20.1** The operating characteristics of the motor shall be verified by conducting a brake test and recording the values of speed and torque at rated voltage and rated current. The recorded value of speed shall not vary by more than $\pm 10\%$ of the nominal specified speed of the motor. The torque developed on the motor shaft during brake testing shall be calculated by multiplying the tension difference between the two spring balances with the effective radius of brake drum. The output of the motor shall then be calculated with the help of the readings of torque and speed. The calculated output of motor shall not vary by more than $\pm 5\%$ from the nominal specified output.
- 20.2** To check the AC immunity level of the motor, 10% of the tension difference obtained by the method indicated in Clause 20.1, under rated conditions, shall be applied on the motor shaft through the same brake drum. An AC voltage shall then be applied across the motor terminals gradually as well as abruptly. The AC voltage, at which the motor just starts rotating shall be considered as the AC immunity level of the motor. The minimum AC immunity level of the motor shall be 160V(r.m.s.) at 50 Hz.

-Amendment 3

~~20.~~ **21. REJECTION**

- ~~20.1~~ **21.1** The motor or any part thereof that does not comply fully with the requirements of this Specification and/ or any other specification and/or drawing as approved by the Purchaser, may be rejected.

-Amendment 3

~~21.~~ **22. PACKING**

- ~~21.1~~ **22.1** The packing shall be done in accordance with Clause 17 of IRS Specification S 23*.

-Amendment 3

~~22.~~ **23. WARRANTY**

- ~~22.1~~ **23.1** The warranty of the product shall be in accordance with Clause 18 of IRS Specification S 23*.

-Amendment 3

* Electrical Signalling and Interlocking Equipment (Tentative).

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APPENDIX 'A'

Information to be supplied by the Purchaser

- A-1 Overall dimensions of the motor (Clause 8.1).
- A-2 Size and position of fixing bolt holes (Clause 8.1).
- A-3 Dimensions, height from base level and any other details of the portion of the shaft protruding outside the casing of the motor (Clause 8.1).
- A-4 Rated out-put in watts. (Clause 14.2).
- A-5 Whether permanent magnet type or split field series type.
- A-6 Requirement of AC immunity, if any.

-Amendment 3