INDIAN RAILWAY
STANDARD SPECIFICATION
FOR
D.C. IRS POST TYPE ELECTRIC SIGNAL REVERSER
(TENTATIVE)

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SIGNAL DIRECTORATE
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Approved by **Sr. Executive Director/ Signal, RDSO**			
Abstract This document specifies Technical specification for DC IRS Post Type Electric Signal Reverser			

DOCUMENT CONTROL SHEET

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Director/ Signal	**RDSO**	**Member**	**Prepare**
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AMENDMENTS

Version	Chapter/ Annexure	Amendment	Effective date
IRS: S 19/1959		FIRST ISSUE	1959
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GOVERNMENT OF INDIA

MINISTRY OF RAILWAYS

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INDIAN RAILWAY

STANDARD SPECIFICATION

For

D.C. IRS POST TYPE ELECTRIC SIGNAL REVERSER

(Tentative)

0. FOREWORD

0.1 This specification is issued under the fixed Serial No. S19 followed by the year of original adoption as standard, or in the case of revision, the year of last revision.

ADOPTED 1959; REVISED 1965 & 2000

0.2 This specification requires reference to the following specifications:-

IRS:S 23 : Specification for Electrical Signalling and Interlocking Equipment.
IS:4800 : Enamelled Round Winding Wires.
IS:2389 : Hex. Head Bolts, Screws, Nuts and Lock Nuts (M 1.6 to M5).

0.3 Wherever reference to any Standard appears in this specification it shall be taken as a reference to the latest version of that standard.

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

1. SCOPE

1.1 This specification applies to D.C. IRS Post Type Electric Signal Reversers intended for use in railway signalling circuits for Electro-mechanical control of semaphore signals, to be used with only the IRS spectacles.

2. TERMINOLOGY

2.1 The Terminology referred to in this specification is covered by IRS specification No. S23.

3. GENERAL REQUIREMENTS

3.1 All parts shall be manufactured strictly in accordance with drawings or samples, as approved by the Purchaser.

3.2 All parts shall be free from liability to distortion which would affect its operation under service conditions.

3.3 Reverser mechanism shall be provided with a metallic weatherproof case and cover.

3.4 The portion of the Armature Lever coming into contact with the roller shall be circular in shape, so that the thrust on the Armature Lever shall pass tangential to the friction circle above the Fulcrum pin of the Armature.

3.5 The reverser shall comply with provisions in IRS Specification No. S23 in respect of Drawings and Specifications, Materials, Workmanship, Limits and Fits, Electro-magnet coils, Magnetic Materials, Electrical Contacts and Springs, Terminals, Wiring, Protection against Corrosion. Approval of Samples, Marking and Identification, Packing, Rejection and Warranty except in so far modified by the provisions of this specification.

3.6 Terminals for external connections shall be Type M4 in accordance with IS: 2389 for Hex. Head Bolts, Screws, Nuts and Lock Nuts (M1.6 to M5) and shall be of nut type. The terminals shall be spaced at not less than 20 mm, between centres. Terminals shall be fastened in their support in such a way that they do not turn or become loose in service.

4. SPECIAL REQUIREMENTS

4.1 Armature and core

4.1.1 The core, yoke and the armature shall be of soft iron having high permeability, high resistively and low remanance. Silicon iron with 2 to 3.5 percent silicon content or any other material which meets the requirements may be used.

4.1.2 A shield of non-ferrous metal to provide a non-magnetic gap in the magnetic circuit of not less than 0.25 mm shall be provided between the armature and the core.

4.2 **Coil**

4.2.1 The material, design and fabrication of coils shall comply with the provisions in IRS:S-23. Enamel wire complying with IS:4800 or to any other approved specification shall be used.

4.2.2 Unless otherwise specified by the purchaser, the resistance of the coil shall be 600 ohms.

5. OPERATING VOLTAGE

5.1 Unless otherwise specified by the Purchaser, the Rated Voltage of the reverser shall be 10 Volts D.C.

5.2 The reverser shall be capable of operating satisfactorily between the limits of 75 percent and 125 percent of the Rated Voltage.

6. INSPECTION AND TESTING

6.1 Inspection and tests shall be carried out to ensure that all requirements of this specification, IRS specification No.S23 and any other drawings and specifications referred to by the purchaser are fully complied with.

6.2 **TYPE TESTS:**

These tests shall be carried out on one no. of Electric Signal Reverser. The following shall constitute type tests:-

(a) Visual Inspection (Clauses 3.1 to 3.6)
(b) Applied High Voltage Test (Clause 14.3.2.1 of IRS:S23 Part-II)
(c) Insulation Resistance Test (Clause 14.3.2.2 of IRS:S23 Part-II)
(d) Performance Tests (Clause 6.5)
(e) Life Test (Clause 6.6)
(f) Climatic Tests (Clause 6.7)
(g) Performance Tests after Climatic tests (Clause 6.8)

6.3 ACCEPTANCE TESTS:

These tests shall be conducted on 10% of a batch subject to a minimum of one Electric Signal Reverser and shall comprise to the following: -

(a) Visual Inspection (Clauses 3.1 to 3.6).
(b) Applied High Voltage Test (Clause 14.3.2.1 of IRS:S23 Part-II)
(c) Insulation Resistance Test (Clause 14.3.2.2 of IRS:S23 Part-II).
(d) Performance Tests (Clause 6.5).

6.4 ROUTINE TESTS

Every assembled signal reverser shall be subjected by the manufacturer to Routine tests, which shall comprise the following: -

(a) Applied High Voltage Test (Clause 14.3.2.1 of IRS: S23 Part-II).
(b) Insulation Resistance Test (Clause 14.3.2.2 of IRS:S23 Part-II)
(c) Performance Tests (Clause 6.5)

6.5 PERFORMANCE TESTS

The reverser after assembly shall be subjected to the under-mentioned Performance Tests. Before conducting these tests, the working diagrams of L.Q. & U.Q. reversers (showing the relative positions of Signal Crank, Operating Crank, Link Mechanism, Signal Spectacles, etc under various operating conditions) as per Drg. Nos. S22205 & S22326 respectively may be kept in view. The manner and the order of the tests shall be as follows: -

6.5.1 Mounting Arrangement of Reverser

The reverser shall be fixed in an upright position as it is intended to be used in its normal application on the semaphore signal post. In this position the two cranks, namely, Signal Crank and the Operating Crank, move in a vertical plane. The load, hereafter called “Test Load” shall be a dead weight which may be applied through a wire rope acting at the connecting pin of the signal crank. All moving parts shall be cleaned free of grease, oil and graphite before the tests.

6.5.2 Mechanism Friction Test

With armature of Electro-magnet held in the position which it would assume when Electro-magnet is energized, it shall be possible to move the link mechanism and the Signal Crank between the limits of operating stroke, with a force of not more

than 6 kg. applied to the connecting pin of the Operating Crank. The test shall be carried out without connecting any Test Load to the Signal Crank. The interference to movement of links due to the dash pot in the initial part of the forward stroke shall not be taken into consideration.

6.5.3 **Residual Magnetism Test**

A Test Load of 9 Kg shall be applied to Signal Crank. The Electro-magnet shall be energised at Rated Voltage. The operating Crank shall be operated so that Signal Crank comes to its reverse position. The voltage on the Electro-magnet coil shall be increased gradually to three times the Rated Voltage. The voltage shall then be gradually decreased upto 75 per cent of Rated Voltage. The applied voltage shall then be removed. The reverser shall freely disengage with removal of applied voltage.

6.5.4 **Full Load Test**

With Test Load of 100 Kg applied to Signal Crank, the electro-magnet coil shall be energised at 75 percent of Rated Voltage. The Operating Crank shall be operated to its reverse position, without the reverser getting disengaged. The Voltage on the electro-magnet coil shall then be gradually increased to three times the Rated Voltage and then gradually decreased until the reverser disengages. The voltage at which it disengages shall not be less than 50 percent of the Rated Voltage.

6.5.5 **25% Load Test**

The test specified in clause 6.5.4 shall be repeated with Test Load of 25 Kg. The voltage at which the reverser disengages shall not be less than 50 percent of the Rated voltage.

6.6 **LIFE TEST**

The electric signal reverser shall be operated continuously for 50, 000 cycles at the rate of one or two cycles per minute. No part of the reverser shall show any erratic behavior at the end of this test.

6.7 **CLIMATIC TESTS**

The following environmental tests shall be conducted on the electric signal reverser in the under-mentioned sequence.

S.No.	Name of test	Part & Section of IS:9000	Recovery Period
1.	Dry heat test at 85°C±2°C (One cycle of 16 hours)	Part-III/ Section 3 of 1977 issue	2 hours
2.	Cold test at -10°C±3°C (One cycle of 16 hours)	Part-II/Section 3 of 1977 issue	2 hours
3.	Damp heat cycling test (One cycle of 12+12=24 hours) (Upper temperature 55°C)	Part-V/Section 2 of 1981 issue	2 hours
4.	Salt atmosphere test (4 cycles of 7 days)	Part-XI/Procedure 2 of 1983 issue	4 hours
5.	Driving rain test for two hours	Part-XVI (Test condition 'C' clause 7.1.3, 1983 issue)	4 hours

6.8 PERFORMANCE TESTS AFTER CLIMATIC TESTS:

The reverser shall pass the following tests after completion of life test & climatic tests.

(i) Insulation resistance test (Clause 14.3.2.2 of IRS: S23 Part-II)
(ii) Performance tests (Clause 6.5)

6.9 REJECTION

The reverser or any part thereof that does not comply fully with the requirements of this specification and/or any other specification and/or of the drawing as approved by the purchaser, may be rejected.

6.10 PACKING

The packing shall be done in accordance with clause 17 of IRS:S23 Part II.

APPENDIX 'A'

Requirements to be specified by the Purchaser

1. Rated Voltage (Clause 5.1)
2. Resistance of the Coil (Clause 4.2.2)

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