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Specification No. IRS: S1-62  
GALVANISED SOLID STEEL WIRE FOR  
SIGNALLING PURPOSES

Revision:5



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**TECHNICAL SPECIFICATION  
FOR  
GALVANISED SOLID STEEL WIRE FOR  
SIGNALLING PURPOSES  
(TENTATIVE)  
SPECIFICATION NO.: IRS: S1-62**

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RESEARCH DESIGNS & STANDARDS ORGANISATION  
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## DOCUMENT DATA SHEET

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<b>Abstract</b>  This document specifies Technical specification for galvanized solid steel wire for Signalling purposes.			

**DOCUMENT CONTROL SHEET**

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## AMENDMENTS

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IRS: S1-1930		FIRST ISSUE	1930
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GOVERNMENT OF INDIA  
MINISTRY OF RAILWAYS  
(RAILWAY BOARD)

सत्यमेव जयते

INDIAN RAILWAY  
STANDARD SPECIFICATION  
FOR  
GALVANISED SOLID STEEL WIRE FOR  
SIGNALLING PURPOSES  
(TENTATIVE)  
Serial No- SI-62**0. FOREWORD.**

0.1. These specifications are issued under the fixed Serial No. S1; the final number indicates the year of original adoption as standard, or in the case of revision, the year of last revision.

ADOPTED 1930; REVISED, 1934, 1937, 1947, 1951, 1962.

0.2. The revision of the year 1962 has been made to introduce the metric units. However, equivalents in FPS system are also given in brackets for guidance. They are not necessarily exact conversions and the FPS units shall be dropped altogether at a later date.

0.3. This specification requires reference to the following British and Indian Standard specification:-

B.S. 443 -1961 Galvanized Coatings on Wire.

I.S. 209-1956 Zinc.

**1. SCOPE.**

1.1. The specification covers requirements for four grades of galvanized solid steel wire for Signalling purposes.

**2. TERMINOLOGY.**

2.1. For the purpose of this standard specification, the following definitions shall apply.

2.1.1. Piece shall mean a length of wire without joint or splice of any description in the finished wire.

2.1.2. Coil shall mean one length of wire in the form of a coil.

2.1.3. Bundle shall mean two or more coils properly bound together.

### **3. QUALITY OF MATERIAL.**

3.1. The wire shall be drawn from homogeneous steel billets made by the Open – Hearth (Acid or Basic), Electric, Duplex or Acid Bessemer process and shall not show on analysis more than 0.05 per cent of sulphur or of phosphorus. The wire manufacturer shall produce the steel Makers cast analysis certifying process to the Inspecting Officer and a signed warrant that the wire has been drawn from the certified steel shall be handed to the Inspecting Officer by the Manufacturer.

3.2. The wire shall be of uniformly coated with virgin Zinc spelter conforming to Indian Standard specification I.S. 209 -1956 of Grade Zn. 98.5 , having a purity of 98.5 per cent.

### **4. GRADE OF WIRE.**

4.1. The wire shall be of one of the grades, shown in the Table as specified by the purchaser .

### **5. FREEDOM FROM DEFECTS.**

5.1. The wire shall be approximately circular in section, pliable, cleanly drawn and free from scale, irregularities, imperfections, flaws, splits and other defects. The Zinc coating shall be smooth, even and bright. Every coil may be examined for defects.

### **6. DIMENSIONS.**

6.1. The wire shall be drawn in continuous pieces and shall be after galvanizing 3.15 m.m. (10 S.W.G., 0.128 in.) in diameter with a tolerance, plus or minus, of 0.05.m.m.(0.002in) .

### **7. PROHIBITION OF JOINTS OR WELDS.**

7.1. Each piece shall be warranted to contain no weld splice , or joint whatsoever, other than in the rod before it is drawn. Pieces shall be selected of such lengths as will make up coils of wire within the limits of length to suit weights given in clause 15.

## **8. TEST SAMPLES.**

8.1. Before any test samples are selected by the purchaser or the Inspecting Officer , the coils or wire shall be arranged in separate batches, each batch comprising 20 coils or 1 tonne (1ton ) which ever is the greater quantity. From each batch one coil shall be selected by the purchaser or the inspecting officer and each batch shall be kept separate until after the tests are made.

8.2. Test samples and coils from which the samples are selected shall be properly labelled for identification.

### **8.3. Sampling for Chemical Analysis:-**

8.3.1 Unless otherwise agreed to between the purchaser and the Supplier, one test for Chemical analysis shall be conducted for each lot/ batch of coils manufactured from a particular cast of group of casts at the option of the purchaser.

### **8.4. Sampling for Mechanical Tests:-**

8.4.1. Samples for the mechanical tests, laid down in Clause 10, shall be cut from one end, or both the ends in case of doubt, of the selected coils from each batch, of sufficient length for the test of the wire and also for two similar re- tests, if required.

## **9. TEST BY MANUFACTURER.**

10.1. Each coil of wire shall be tested by the manufacture for tensile strength, reverse bending and wrapping, and the records of such tests shall be available for scrutiny by the purchaser or his representative. Test samples cut from both ends of each selected coil of wire shall be tested, if so specified by the purchaser or desired by the Inspecting Officer.

## **10. MECHANICAL TESTS.**

10.1. Elongation test :-

10.1.1. The elongation of the wire, when tested in the manner described shall not exceed the limit specified in the table.

10.1.2. The elongation test shall be made on a sample having a free gauge length of 250 m.m. ( 10 in.) between the grips of the testing machine. The samples shall be steadily elongated until it breaks. The duration of the test shall be approximately 30 seconds. The elongation shall be measured after fracture and after the ends have been brought together again.



**10.2. Tensile Test :-**

10.2.1. The figures for the ultimate tensile strength are those obtained by dividing the breaking load of the galvanized wire by the total area of the section, as calculated from the overall diameter. The braking load of the wire shall be within the limits specified in the Table.

10.2.2. A lever or other testing machine shall be used , the accuracy of which can be easily checked and the machine adjusted , if necessary . The machine shall be subject to the approval of the purchaser or the Inspecting Officer, who shall be afforded requisite facilities for proving its correctness. The test sample of wire, as cut from the piece, shall be placed in the machine without being straightened or prepared in any way before testing. Nine – tenths of the minimum breaking load shall be applied quickly and the load shall be increased steadily until the sample breaks. The time occupied in applying the remainder of the load shall be as nearly as possible 20 Seconds and the total time from the application of the load to the break shall be approximately 30 Seconds.

**10.3. Reverse Bend Test :-**

10.3.1. Test samples , when tested in the manner described below shall withstand without breaking or showing signs of splitting or other defects, the number of reverse bends specified in Column 5 of the Table.

10.3.2. The test shall be made in the following manner:-

(a) The wire shall carefully straightened, care being taken that such straightening does not damage it.

(b) The fixed end of the wire shall be secured in a vice in such a way that the wire is not gripped by the rollers over which it is bent.

(c) The wire shall withstand being bent cold backwards and forwards through 180 ° over a radius of 10 m.m. for a specified number of times. The first bend of 90° shall not be counted , but each subsequent bend of 180 ° shall be counted as one bend.

**10.4. Wrapping Test:-**

10.4.1. The wire shall withstand being wrapped eight turns around its own diameter and subsequently unwrapped without showing any signs of fracture.

## **11. GALVANISING TESTS.**

11.1. The zinc coating on the wires shall be tested by the method laid down in B.S. Specification No. 443 – 1961 for Galvanized Coatings on wire and shall have a minimum weight of spelter coat as laid down in Table IA of that specification.

## **12. TESTING FACILITES.**

12.1. The wire shall be inspected and tested at the works where it is made The Contractor shall supply, without making any claim or charge in respect there of all the necessary machinery , apparatus and labour required for inspection and testing. The testing plant shall be under the immediate control of the purchaser or the inspecting officer during the tests. All the wire used in test shall be supplied by the Contractor free of Charge.

## **13. INSPECTION.**

13.1. The purchaser or the Inspecting Officer shall have the right to be present during all stages of manufacture, and shall be afforded all reasonable facilities for satisfying himself that the wire is being manufactured in accordance with the terms of this Specification.

## **14. REJECTION.**

14.1 . Should any one of the test pieces first selected for test fail to comply with any one or more of the tests laid down in this Specification, two further samples shall be selected from the same coil of wire for testing in the same manner in which failure occurred, in respect of each failure. If the test pieces from both the additional test samples comply with the requirements of this Specification on re- tests. The batch of material represented by the test samples shall be accepted. Should the test pieces from either of these additional samples fail, the batch of material represented by the test samples shall be liable to rejection.

## **15. COILING.**

15.1. The wire shall be smoothly and uniformly coiled so that the dia. of the eye of the coil shall not be less than 500 m.m. (20in) or not greater than 600m.m (24.in).

15.2. Weight of coils shall be 45-55 Kg. ( 100-120 lbs. ) for not less than 50 percent of the consignment and 25-45 Kg. (50-100lbs. ) or 55-65 Kg. (120-140lbs. ) for not more than 50 per cent of the consignment.

## **16. MARKING.**

16.1. Each coil shall be provided with a metallic label , firmly fixed by wiring to the inner part of the coil, bearing the following information:-

- (i) Manufacture's name or Trade Mark.
- (ii) Lot number and coil number.
- (iii) A brief description and grade of the material.
- (iv) Net weight to the nearest Kg. (lb.)

### 17. PACKING.

17.1. After approval, each coil shall be securely bound with four separate binders of galvanized wire of a size not less than 2 mm( 14 S.W.G., 0.080 in.)

17.2. The coils will than each be wrapped in stout Hessian or other suitable material for their protection during transit.

17.3. A suitable label giving the gross weight of the coil or bundle including the weight of packing, shall be attached after packing.

### 18. OILING.

18.1. Coils, if so ordered, shall be dipped in boiled linseed oil to I.S. specification No. 77 after having been bound and labelled. The oil shall be heated to a suitable temperature.

**Table**

Galvanized Solid steel wire for signaling purpose diameter 3.15mm ( 10. S.W.G. , 0.128 in) after galvanizing.

Grade of Wire	Ultimate tensile strength of galvanized wire (See Clause 10.2)		Maximum elongation* * on 250 mm. (10in.)	Breaking load		Minimum No.of reverse bends over a 10mm. radius
1	2		3	4		5
	Kg. per sq.m.m.	(Tons per sq. in.)	Per cent	Min Kg. (lbs. )	Max (lbs.)	
1	80-95	(50-60)	8	624 (1441)	740 (1730)	10
2	95-110	(60-70 )	8	741 (1730)	857 (2018)	10
3	110-125	( 70-80)	8	858 (2018)	973(2306)	10
4	125-140	(80-90)	8	974 (2306)	1091(2595)	10

\* The figures for the ultimate tensile strength are those obtained by dividing the breaking load of the galvanized wire by the nominal sectional area.

\* \* The purpose of including the elongation test is to exclude the supply of annealed finished wire and for this purpose the value is definitely specified as a maximum.