BRITISH STANDARD

BS 182:1972

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Specification for

Galvanized line-wire for telephone and telegraph purposes

Co-operating organizations

The Iron and Steel Industry Standards Committee, under whose supervision this British Standard was prepared, consists of representatives from the following Government departments and scientific and industrial organizations:

British Cast Iron Research Association
British Constructional Steelwork Association
British Ironfounders' Association
British Mechanical Engineering Confederation
British Steel Industry*
Council of Iron Producers
Council of Ironfoundry Associations
Department of Employment
Department of Trade and Industry (Marine Division)
Engineering Equipment Users' Association
Federation of Civil Engineering Contractors
Institute of British Foundrymen
Institute of Iron and Steel Wire Manufacturers*
Institute of Marine Engineers
Institution of Civil Engineers
Institution of Mechanical Engineers (Automobile Div.)
Institution of Production Engineers
Institution of Structural Engineers
Lloyds Register of Shipping
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Stainless Steel Development Association
Steel Castings Research and Trade Association
Tank and Industrial Plant Association
Tin Research Institute
Water-Tube Boilermakers' Association

The scientific and industrial organizations marked with an asterisk in the above list, together with the following, were directly represented on the committee entrusted with the preparation of this British Standard:

Alloy and Stainless Steel Conference
British Bolt, Nut, Screw and Rivet Federation
British Railways Board
British Wire Netting Association
Electric Cable Makers' Confederation
Electricity Council, The Central Electricity Generating Board and the Area Boards in England and Wales
Fencing Contractors' Association
Institution of Engineering Inspection
Post Office
Society of Chain Link Fencing Manufacturers
Society of Motor Manufacturers and Traders
Spring Research Association
An individual firm

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Committee references ISE/26/11
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Contents

Foreword

This standard makes reference to the following British Standards:

BS 443, *Galvanized coatings on wire.*

BS 3239, *Determination of resistivity of metallic electrical conductor materials.*

BS 4545, *Methods for mechanical testing of steel wire.*

This metric revision of BS 182, which has been prepared under the authority of the Iron and Steel Industry Standards Committee, replaces the 1938 edition of the standard which was published with BS 183 and BS 184 under one cover.

The technical requirements of users of galvanized line-wire for telephone and telegraph purposes have brought about the inclusion in this standard of many values which are conversions of the imperial values specified in the 1938 edition.

An Appendix B has been added giving an alternative method of acceptance testing based on inspection by attributes.

For continuity, the designation system used in the 1938 edition has been retained. This was related to the nominal weight in pounds per mile.

A British Standard does not purport to include all the necessary provisions of a contract. Users of British Standards are responsible for their correct application.

Compliance with a British Standard does not of itself confer immunity from legal obligations.

Summary of pages

This document comprises a front cover, an inside front cover, pages i and ii, pages 1 to 4 and a back cover.

This standard has been updated (see copyright date) and may have had amendments incorporated. This will be indicated in the amendment table on the inside front cover.

1 Scope

This British Standard specifies the electrical and mechanical properties of galvanized line-wire for telegraph and telephone purposes for a number of diameters between 1.52 mm and 6.07 mm.

NOTE The titles of British Standards referred to in this standard are given on page ii.

2 Definitions

For the purposes of this British Standard the following definitions apply:

2.1
coil

a single length of finished wire without joint or splice of any description, wound in close packed concentric rings

2.2
bundle

two or more coils bound together

2.3
batch

any quantity of finished wire presented for examination and test at any one time.

2.4
test piece

a length of wire taken for test in accordance with this standard.

2.5
sample

one or more test pieces selected from a batch in accordance with this standard or alternatively as agreed between the manufacturer and purchaser

3 Information to be supplied by the purchaser

The following information should be given on the enquiry and order:

1) The type of wire required, described by the number of this standard and the appropriate designation, e.g. BS 182; GSL.200.

2) If inspection and testing is to be carried out in accordance with the method of acceptance testing based on inspection by attributes as described in Appendix B. (See **8** and Appendix B.)

4 Manufacture

The wire shall be drawn from low carbon steel and shall be supplied in a softened condition. It shall be galvanized by the hot dip or electrolytic process.

5 Joints

The wire shall contain no weld or joint other than in the rod before it is drawn.

By agreement between the purchaser and the manufacturer where special lengths are required which are outside the scope of the normal production of the manufacturer, wire may be supplied with joints made by welding after drawing and before galvanizing.

NOTE It should be noted that in such cases, the mechanical properties of the wire in a section containing a weld will not necessarily comply with all the requirements of this standard.

6 Freedom from defects

The wire shall be of good uniform quality, free from splits, surface flaws, piping and other harmful defects. The wire shall be smoothly galvanized and free from bare spots.

7 Tolerances

The wire shall comply with the diameter and weight tolerances given in Table 1. The diameter of the wire shall be the mean of two readings taken at right angles to each other in the same plane. No individual reading shall lie outside the limits of tolerance given in Table 1.

8 Inspection and testing

Selection of test pieces and all tests shall be carried out at the manufacturer's works in accordance with **9**, **10**, **11** and **12**, or if agreed between the purchaser and the manufacturer, in accordance with Appendix B. If test certificates are required, or the purchaser, or his representative, wishes to witness the selection of the test pieces and the tests, this shall be stated on the order.

9 Selection of test pieces

A sufficient length, for the tests specified in **10**, **11** and **12** shall be cut from each end of the finished coils at the rate of one coil for every ten coils or part thereof in any one batch.

10 Mechanical test requirements

10.1 General. Any straightening which the test pieces, used for the tests specified in **10.2** and **10.3**, may require shall be carried out in the cold condition in accordance with BS 4545.

10.2 Tensile test. The tensile test shall be carried out in accordance with BS 4545 but in routine testing on machines with fixed rates of separation of the grips, the test length between grips shall be between 100 mm and 200 mm and the rate of separation of the grips shall not be less than 25 % or more than 50 % of the test length/minute.

The breaking load of the wire shall be within the limits given in Table 1 for the appropriate designation.

10.3 Ductility test. The test piece shall withstand being wrapped eight turns on a mandrel of its own diameter, and unwrapped seven turns, without fracture of the wire.

11 Electrical test requirement

The electrical resistance per kilometre of the test piece determined in accordance with the routine method specified in BS 3239 and multiplied by $\frac{W}{K}C$ shall not exceed the value given in Table 1.

where K = nominal mass per kilometre;
W = mass per kilometre of test piece;
C = factor for the conversion of electrical resistance to 20 °C (see Appendix A).

12 Tests on galvanizing

The galvanized wire shall be tested in accordance with the requirements of BS 443, and shall comply with that standard in respect of the weight, uniformity and adherence of the zinc coating.

13 Retests

Should a test piece fail to meet any of the test requirements, two additional tests in respect of the same requirements shall be made on material taken from the same coil.

Provided the results of the additional tests fulfil the requirements, all the material represented shall be deemed to comply with this British Standard.

If the results of either of these additional tests do not fulfil the test requirements, the coil from which the test piece was cut shall be deemed not to comply with this British Standard. The remaining material may be accepted provided that further test pieces cut from the remaining coils, as specified in **9**, are tested in accordance with this British Standard, and meet its requirements.

14 Packing and marking

Unless otherwise specified the internal diameter of a bound coil shall be not less than 480 mm and not more than 530 mm. Each coil shall be securely bound and the material used for the binders shall be such that it has no deleterious or corrosive effect on the wire.

A durable label shall be securely attached to the inside of each coil and indelibly marked with the manufacturer's name, the number of this British Standard, the nominal size and designation of the wire, and the mass of the coil to the nearest 0.5 kg.

Table 1 — Galvanized steel line-wire

Designation	Mass			Diameter			Breaking load of wire		Maximum resistance of wire of nominal mass at 20 °C	Constant, being nominal mass per km × resistance per km at 20 °C	Mass of each coil	
	Nominal	Min.	Max.	Nominal	Min.	Max.	Min.	Max.			Min.	Max.
	kg/km	kg/km	kg/km	mm	mm	mm	N	N	Ω/km		kg	kg
GSL. 800	225	220	231	6.07	6.00	6.15	9 620	13 810	4.23	953	41	54
GSL. 600	169	165	174	5.26	5.18	5.33	7 160	10 380	5.64	953	41	54
GSL. 450	127	121	131	4.55	4.47	4.62	5 330	7 790	7.52	953	41	54
GSL. 400	113	109	116	4.29	4.22	4.37	4 750	6 980	8.46	953	41	54
GSL. 300	84.6	80.9	87.7	3.71	3.63	3.78	3 520	5 220	11.28	953	32	54
GSL. 200	56.4	54.1	59.9	3.05	2.97	3.12	2 360	3 560	16.9	953	23	54
GSL. 150	42.3	39.5	44.3	2.62	2.54	2.69	1 720	2 640	22.5	953	23	54
GSL. 100	28.2	27.1	29.9	2.16	2.11	2.21	1 190	1 780	33.8	953	23	54
GSL. 75	21.3	19.7	22.3	1.85	1.80	1.91	860	1 330	45.1	953	23	54
GSL. 50	14.1	13.3	14.7	1.52	1.47	1.55	580	880	67.6	953	7	14

NOTE 1 The diameters equivalent to the standard masses are given correct to the second decimal place, while the masses equivalent to the maximum and minimum diameters are correct to the nearest kg for masses of 100 kg/km or more and to the nearest 0.1 kg/km for masses of less than 100 kg/km.

NOTE 2 The values for the breaking load of wire have been calculated on the basis of a tensile strength of 340 N/mm^2 on minimum diameter and 465 N/mm^2 on maximum diameter.

Wires designated GSL. 200 down to GSL. 50 may be delivered in bundles, provided that the weight of any bundle does not exceed 54 kg.

Appendix A Factors for the conversion of electrical resistance to 20 °C

Temperature at which resistance is measured °C	Factor for converting to 20 °C
0	1.1077
1	1.1017
2	1.0959
3	1.0901
4	1.0843
5	1.0786
6	1.0730
7	1.0674
8	1.0619
9	1.0565
10	1.0511
11	1.0457
12	1.0405
13	1.0352
14	1.0300
15	1.0249
16	1.0198
17	1.0148
18	1.0098
19	1.0049
20	1.0000
21	0.9952
22	0.9904
23	0.9856
24	0.9809
25	0.9763
26	0.9717
27	0.9671
28	0.9626
29	0.9510
30	0.9537
31	0.9493
32	0.9449
33	0.9406
34	0.9363
35	0.9321
36	0.9279
37	0.9237
38	0.9196
39	0.9155
40	0.9114

Appendix B Alternative method of acceptance testing (See **8**)

B.1 General

If agreed between the purchaser and the manufacturer, an alternative method of acceptance testing based on inspection by attributes may be used in which case the procedure detailed in this appendix may replace the requirements of **9** and **13**.

B.2 Definitions

For the purposes of this appendix the following definitions, additional to those shown in **2**, apply:

1) *Defective*. Any test piece which contains one or more defects.

2) *Acceptance number*. The maximum number of defectives permitted in a sample.

3) *Acceptable quality level*. The maximum percentage of defectives permissible on average in bulk production.

B.3 Method

In using this scheme the purchaser will specify the degree of non-conformity he can tolerate by quoting an "Acceptable Quality Level" (AQL) in terms of the maximum percentage of defectives permissible on average in the bulk production. The quality of the submitted product will be determined by testing a sample selected at random from each batch presented by the contractor. Since judgement of the quality of a particular batch is to be made from a sample there is a risk that the wrong decision to reject or accept may be made. The size of the sample, the number of defectives permitted in the sample [Acceptance Number (AN)] and the subsequent risk of rejection of a batch of the Acceptable Quality Level will be determined from the Poisson or Binomial distribution and agreed between the purchaser and the manufacturer.

Suitable sampling schemes will be found in Defence Specification DEF 131 "Sampling Procedures and Tables for Inspection by Attributes".

If this method of acceptance testing is adopted, the following provisions shall apply:

1) A sample for mechanical and electrical tests will be taken from each batch. The test pieces comprising the sample may be taken from both ends of any selected coil or from the top of any reel (see **9**).

2) The whole of a batch of wire shall be deemed not to comply with this British Standard if the number of test pieces in the sample taken from that batch which failed to pass any of the requirements in this standard exceeds the maximum number previously agreed between the purchaser and the manufacturer.

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