BRITISH STANDARD

BS 183:1972

Incorporating Amendment Nos. 1 and 2

Specification for

General purpose galvanized steel wire strand

Confirmed January 2011

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 & Steel Wire Manufacturers*
Institute of Marine Engineers
Institution of Mechanical Engineers (Automobile Div.)
Institution of Production Engineers
Institution of Structural Engineers
Lloyds Register of Shipping
Ministry of Defence, Army Department
Ministry of Defence
National Association of Drop Forgers & Stampers
National Physical Laboratory (Department of Trade and industry)
Oil Companies' Materials Association
Royal Institute of British Architects
Shipbuilders' & Repairers' National Association
Society of Motor Manufacturers & Traders Limited*
Stainless Steel Development Association
Steel Castings Research and Trade Association
Tank & 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 & Stainless Steel Conference
British Bolt, Nut, Screw & 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 & Wales
Fencing Contractors' Association
Institution of Engineering Inspection
Post Office
Society of Chain Link Fencing Manufacturers
Spring Research Association
An individual firm

This British Standard, having been approved by the Iron and Steel Industry Standards Committee, was published under the authority of the Executive Board on 19 June 1972

First published (as part of BS 16:1905)
First published (as BS 174 to 184) February 1923
First published (as BS 182 to 184) May 1927
First revision October 1938
First published as BS 183 June 1972

The following BSI references relate to the work on this standard:
Committee reference ISM/26
Draft for comment 71/41979

ISBN 0 580 07253 3

Amendments issued since publication

Amd. No.	Date of issue	Comments
3119	July 1979	
6535	September 1991	Indicated by a sideline in the margin

Contents

Foreword

This standard makes reference to the following British Standards:

BS 443, *Specification for testing zinc coatings on steel wire and for quality requirements.*

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

BS 6000, *Guide to the use of BS 6001, "Sampling procedures and tables for inspection by attributes".*

BS 6001, *Sampling procedures and tables for inspection by attributes.*

This metric revision of BS 183, 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 182 and BS 184 under one cover.

In reviewing the scope of the previous edition entitled *"Galvanized stay strand for telegraph and telephone purposes"*, it became apparent that the standard had been used beyond its normal scope. The limited use of signalling strand conforming to BS 163-1 brought into question the need for the continued existence of a separate standard. This metric revision has therefore been extended to cover a wider range of strands and to incorporate the requirements of BS 163-1 which will now be withdrawn.

In recognition of the variety of uses of strand, the title has been changed to incorporate this and it is intended to cover such uses as:

1) suspension of telecommunication cables;

2) stay strand for poles supporting overhead cables, domestic TV aerials and similar applications;

3) signalling strand.

The standard does not specify requirements for strands used in major civil engineering works, such as prestressed concrete, suspension bridges and TV and radio transmission masts.

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 6, an inside back cover 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 requirements for seven tensile strength grades of galvanized steel wire strand in sizes from 1.7 mm to 23.8 mm diameter, intended for a variety of purposes including railway signalling strand.

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

2 Definitions

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

2.1
strand

three or more wires twisted together with a uniform lay

2.2
direction of lay

the direction of lay is defined as right-hand or left-hand

with right-hand lay, the wires conform to the direction of the central part of the letter Z when the strand is held vertically. With left-hand lay, the wires conform to the direction of the central part of the letter S when the strand is held vertically

2.3
coil

one continuous length of strand wound uniformly in approximately concentric rings

2.4
bundle

two or more coils securely bound together

2.5
test piece

a length of strand taken for test in accordance with this standard

3 Designation

The type of wire strand is designated by construction and grade. The construction is the number of wires followed by the wire diameter in mm, e.g. 3/1.80 except in the case of railway signalling strand when the number of wires is followed by the letters "RS", e.g. 7/RS. The grade is the nominal tensile strength of the strand in N/mm^2. Examples of the complete designation are 3/1.80/350 and 7/RS/350.

4 Information to be supplied by the purchaser

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

1) The type of wire strand required, described by the number of this standard and the appropriate designation, e.g. BS 183; designation 3/1.80/350.

2) The mass of strand required.

3) In the case of coils, whether they are required to be dipped in an oil or other protective compound.

4) If inspection and testing is to be carried out in accordance with the method of acceptance testing based on inspection by attributes (see Clause **6**).

5 Manufacture

5.1 Wire

5.1.1 *Material*. The wire shall be drawn from steel, made by any process except that the air, and mixed air-oxygen, bottom blown basic converter shall not be used.

5.1.2 *Galvanizing*. The galvanized coating shall comply with the requirements of BS 443, unless otherwise agreed between purchaser and manufacturer.

5.1.3 *Freedom from defects*. The finished wire shall be free from harmful defects.

5.1.4 *Joints during wire manufacture*. For grades 350 and 480, welds shall be permitted at the option of the manufacturer at any stage prior to galvanizing.

For all other grades there shall be no welds in the wire other than those made in the base rod or wire before drawing.

5.2 Strand lay

5.2.1 The outer wire of all strand shall have a right-hand lay unless otherwise specified by the purchaser.

In 19-wire strand the outer twelve wires shall be normally laid up in reverse direction to that of the inner layer, but they may be laid-up in the same direction if agreed between manufacturer and purchaser.

5.2.2 *General strand*. The lay length of general strand shall be 12 to 18 times the nominal overall diameter of the strand.

5.2.3 *Railway signalling strand*. The lay length of railway signalling strand shall be 15 to 18 times the nominal overall diameter of the strand.

5.3 Joints during stranding

5.3.1 For grades 350 and 480 no joints shall be made during stranding if there are less than 5 wires in the strand.

5.3.2 For grades 350 and 480 if there are 5 or 7 wires in the strand and for grades 700 to 1 300 if there are 7 wires in the strand, joints shall be permitted in the individual wires during stranding, but these stranding joints shall be not less than 15 m apart in the finished strand.

5.3.3 For all grades of 19-wire strand, joints in the wire during stranding shall be permitted provided they are kept to a minimum and well spaced.

5.3.4 Joints made during stranding shall be protected against corrosion.

NOTE The normal lengths of strand which can be supplied without stranding joints in the individual wires are given in Appendix A.

6 Inspection and testing

Selection of test pieces and all tests shall be carried out in accordance with Clauses **7**, **8**, **9**, **10** and **11**, at the manufacturer's works or if agreed between the purchaser and the manufacturer, in accordance with BS 6001.

NOTE Attention is drawn to BS 6000, "*Guide to the use of BS 6001, "Sampling procedures and tables for inspection by attributes*"".

7 Selection of test pieces

7.1 Care shall be taken to ensure that test pieces are not damaged, either before removing or during removal from the coil.

7.2 General strand. One test piece shall be taken from each coil or drum of strand. Where split lengths are supplied test results on the original coils shall apply.

7.3 Railway signalling strand. The coils shall be arranged in separate batches, each batch consisting of 20 coils or 1 000 kg, whichever is the greater mass. From each batch, one coil shall be selected by the purchaser or his representative and a test piece taken from this coil. Each batch shall be kept separate until after the tests are made. These batches, the coil from which the test pieces are taken, and the test pieces shall be labelled for identification.

8 Diameter

The diameter of the test piece shall be determined with a micrometer by taking two measurements at right angles to each other at three places along a length of not less than 250 mm, and the average of these six measurements shall be taken as being the diameter of the galvanized wire.

The tolerances on the diameter shall be in accordance with Table 1.

Table 1 — Tolerances on diameter

Diameter	Tolerance
mm	mm
Finer than 0.90	± 0.03
1.50, 1.40, 1.25, 1.00 and 0.90	± 0.04
2.65, 2,.50, 2.36, 2.00, 1.80, and 1.60	± 0.06
3.25, 3.15 and 3.00	± 0.08
3.65 and thicker	± 0.10

9 Tensile and elongation test

9.1 Method

9.1.1 The ends of the strand shall be suitably prepared by either filling in the interstices with finer wire, or other approved means, to minimise failure in the testing machine grips. The load shall be applied at a steady rate not exceeding that equivalent to 100 N/mm^2 per second.

An initial load of 10 % of the specified breaking load shall be applied to the test piece, at which stage the distance apart of the testing machine grips shall be approximately 600 mm (see **9.1.2**).

9.1.2 For routine determination of tensile strength only, the straining rate shall be preset to give a separation of the grips not greater than 40 % of the test length per-minute. In cases of dispute the requirements of **9.1.1** shall apply.

9.1.3 The elongation shall be determined as the percentage increase in separation between the grips from the position after application of the initial load to the position at the initial failure in the test piece.

Elongation tests shall be made on lengths of strand which do not contain wire joints.

9.1.4 If the test piece breaks within 25 mm of the grips of the testing machine, and shows less than the specified elongation, the test shall be disregarded and further tests made until the break occurs more than 25 mm from the grips. Additional test pieces shall be taken from the same coil or drum when the previous tests are to be disregarded.

9.2 Tensile test. When tested in accordance with **9.1** the minimum breaking load of the strand shall be in accordance with the requirements of Table 3.

9.3 Elongation test

When tested in accordance with **9.1** the elongation of the strand in 600 mm shall be not less than that specified in Table 2.

Table 2 — Minimum elongation of strand

Grade	Minimum elongation in 600 mm
	%
350	12
480	12
700	8
850	6
1 000	6
1 150	4
1 300	4

10 Wrapping test

All wires removed from the test piece shall withstand being wrapped 8 close turns around a mandrel of diameter equal to the nominal diameter of the individual wires when tested in accordance with BS 4545.

11 Reverse bend test for railway signalling strand

All wires removed from the test piece shall withstand without breaking, 15 reverse bends over a radius of 5 mm, when tested in accordance with BS 4545.

12 Retests

12.1 General strand. 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. If the results of both additional tests fulfil the requirements, the coil shall be deemed to comply with this British Standard. If either of the additional tests do not meet the requirements, the coil shall be deemed not to comply with this British Standard.

12.2 Railway signalling strand. Should a test piece from the coil representing a batch fail to meet any of the test requirements, the retest procedure given in **12.1** shall be followed.

If both retests fulfil the requirements, the batch represented by the coil shall be deemed to comply with this British Standard. If either retest fails to meet the requirements, the coil shall be deemed not to comply with this British Standard and the remaining coils in the batch shall be tested for compliance with this British Standard.

13 Packing

13.1 Strand other than 19-wire strand. This strand shall be supplied uniformly wound in coils with the diameter of the eye of the coil as indicated in Table 4.

Such strand may be supplied in coils of other eye diameter, or on drums, subject to agreement between the manufacturer and purchaser.

Each coil shall be securely bound with four separate binders of galvanized steel wire of not less than 2 mm nor greater than 3.75 mm diameter. In no case shall coils be bound or otherwise fastened together unless specifically agreed by the purchaser.

13.2 Nineteen-wire strand. Unless otherwise agreed between the manufacturer and the purchaser 19-wire strand shall be supplied on drums, the barrel diameter of which shall be not less than 45 times the overall diameter of the completed strand. The lower tensile strength strands may be supplied on drums of smaller barrel diameter by agreement between purchaser and manufacturer. The drum shall be so designed that it will take the mass specified with a flange diameter approximately twice the width of the barrel.

13.3 Railway signalling strand. For the UK market railway signalling strand shall be packed in coils of 20–28 kilograms, of which not more than 10 % shall be in coils of less than 24 kilograms, but strand for export may be supplied in coils of masses as specified by the purchaser, of which not less than 90 % shall be of a specified mass and not more than 10 % above or below this mass. If no masses are specified the mass of each coil shall be between 38 kilograms and 50 kilograms.

13.4 Labelling. Each coil or drum shall carry a metal or other approved label marked with the manufacturer's name, the designation of the strand, and the net mass to the nearest half kilogram. In the case of railway signalling strand the label shall also carry the year of supply.

13.5 Wrapping. All coils of strand, other than railway signalling strand, shall be wrapped in hessian and packed and delivered as ordered.

Railway signalling strand is normally supplied unwrapped in the UK, but if required for export purposes, hessian or other wrapping is required, for single coils and/or bundles. A suitable label giving the gross mass of the coil or bundle and the mass of the packing, shall be attached after packing.

14 Oiling

Coils shall be dipped in an oil or other protective compound agreed between the manufacturer and the purchaser if specified by the purchaser on his enquiry or order.

Table 3 — Construction, grades and minimum breaking loads of general purpose galvanized steel wire strand

Construction Number of wires/wire diameter	Approximate strand diameter[a]	Minimum breaking load of strand							Approx.[b] mass
		Grade 350	Grade 480	Grade 700	Grade 850	Grade 1 000	Grade 1 150	Grade 1 300	
	mm	kN	kN	kN	kN	kN	kN	kN	kg/1 000 m
3/1.80	3.9	2.65	3.66	—	—	—	—	—	60
3/2.65	5.7	5.80	7.95	—	—	—	—	—	130
3/3.25	7.0	8.70	11.95	—	—	—	—	—	195
3/4.00	8.6	13.20	18.10	—	—	—	—	—	295
4/1.80	4.4	3.55	4.90	—	—	—	—	—	80
4/2.65	6.4	7.70	10.60	—	—	—	—	—	172
4/3.25	7.9	11.60	15.90	—	—	—	—	—	260
4/4.00	9.7	17.60	24.10	35.20	—	—	—	—	390
5/1.50	4.1	3.10	4.24	6.18	—	—	—	—	69
5/1.80	4.9	4.45	6.10	8.90	—	—	—	—	95
5/2.65	7.2	9.65	13.25	19.30	—	—	—	—	220
5/3.25	8.8	14.50	19.90	29.00	—	—	—	—	320
5/4.00	10.8	22.00	30.15	43.95	—	—	—	—	490
7/0.56	1.7	0.60	0.83	1.20	—	1.70	1.98	2.24	14
7/0.71	2.1	0.97	1.33	1.94	—	2.75	3.19	3.60	28
7/0.85	2.6	1.39	1.90	2.80	—	3.95	4.57	5.15	31
7/0.90	2.7	1.55	2.14	3.10	—	4.45	5.12	5.80	35
7/1.00	3.0	1.92	2.64	3.85	—	5.50	6.32	7.15	43
7/1.25	3.8	3.01	4.10	6.00	—	8.55	9.88	11.15	67
7/1.40	4.2	3.75	5.17	7.54	9.16	10.75	12.35	14.00	84
7/RS[c]	4.3	3.85	5.28	7.70	9.35	11.00	12.65	14.30	86

Table 3 — Construction, grades and minimum breaking loads of general purpose galvanized steel wire strand

Construction Number of wires/wire diameter	Approximate strand diameter[a]	Minimum breaking load of strand							Approx.[b] mass
		Grade 350	Grade 480	Grade 700	Grade 850	Grade 1 000	Grade 1 150	Grade 1 300	
	mm	kN	kN	kN	kN	kN	kN	kN	kg/1 000 m
7/1.60	4.8	4.90	6.75	9.85	11.95	14.10	16.20	18.30	110
7/1.80	5.4	6.23	8.55	12.45	—	17.80	20.50	23.20	140
7/2.00	6.0	7.70	10.55	15.40	—	22.00	25.30	28.60	170
7/2.36	7.1	10.70	14.70	21.40	—	30.60	35.20	39.80	240
7/2.65	8.0	13.50	18.50	27.00	—	38.60	44.40	50.20	300
7/3.00	9.0	17.30	23.75	34.65	—	49.50	56.90	64.30	392
7/3.15	9.5	19.10	26.20	38.20	—	54.55	62.75	70.90	430
7/3.25	9.8	20.30	27.85	40.65	—	58.05	66.80	75.50	460
7/3.65	11.0	25.60	35.15	51.25	—	73.25	84.20	95.20	570
7/4.00	12.0	30.90	42.20	61.60	—	88.00	101.0	114.0	690
7/4.25	12.8	34.75	47.65	69.50	—	99.30	114.0	129.0	780
7/4.75	14.0	43.40	59.45	86.80	—	124.0	142.7	161.3	970
19/1.00	5.0	5.22	7.16	10.45	—	14.92	17.16	19.40	120
19/1.25	6.3	8.16	11.19	16.32	—	23.32	26.81	30.31	180
19/1.40	7.0	10.24	14.04	20.47	—	29.25	33.64	38.02	230
19/1.60	8.0	13.37	18.34	26.75	—	38.20	43.93	49.66	300
19/2.00	10.0	20.90	28.65	41.78	50.74	59.69	68.64	77.60	470
19/2.50	12.5	32.65	44.80	65.29	79.28	93.27	107.3	121.3	730
19/3.00	15.0	47.00	64.50	94.00	114.1	134.3	154.5	174.6	1 050
19/3.55	17.8	65.80	90.27	131.6	159.9	188.0	216.3	244.5	1 470
19/4.00	20.0	83.55	114.6	167.1	203.0	238.7	274.6	310.4	1 870
19/4.75	23.8	117.85	161.6	235.7	286.0	336.7	387.2	437.7	2 630

[a] For information only.

[b] For information only and calculated on a specific gravity for galvanized wire of 7.8 and the minimum lay length.

[c] The construction of this strand consists of six wires of 1.40 mm diameter on a centre wire of 1.50 mm diameter. The diameter of the centre wire shall not be less than 0.08 mm nor more than 0.12 mm greater than the diameter of the outer wire.

Table 4 — Coil eye diameters

Construction	Diameter of eye of coil	
	minimum	maximum
	mm	mm
3/1.80	400	560
5/2.65	425	650
3/3.25	425	650
3/4.00	650	750
4/1.80	400	560
4/2.65	425	650
4/3.25	425	650
4/4.00	650	750
5/1.50	350	550
5/1.80	400	560
5/2.65	425	650
5/3.25	425	650
5/4.00	650	750
7/0.56	250	350
7/0.71	250	350
7/0.85	250	350
7/0.90	250	350
7/1.00	250	350
7/1.25	250	350
7/1.40	350	550
7/RS	350	430
7/1.60	350	550
7/1.80	400	560
7/2.00	400	560
7/2.36	425	650
7/2.65	425	650
7/3.00	425	650
7/3.15	425	650
7/3.25	425	650
7/3.65	650	750
7/4.00	650	750
7/4.25	650	750
7/4.75	650	750

Appendix A Lengths of strand without joints

The normal lengths of strand which can be supplied without stranding joints in the individual wires are shown below:

Wire diameter	Length
mm	m
0.90 and smaller	3 000
1.00	3 000
1.25	3 000
1.40	3 000
1.50	3 000
1.60	3 000
1.80	3 000
2.00	3 000
2.36	2 900
2.50	2 600
2.65	2 300
3.00	1 800
3.15	1 650
3.25	1 500
3.65	1 200
4.00	1 000
4.25	890
4.75	700

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