



BS 302 : Part 2 : 1987

UDC 677.721

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British Standard

Stranded steel wire ropes

Part 2. Specification for ropes for general purposes

Câbles toronnés en acier
Partie 2. Câbles d'usage général — Spécifications

Litzenseile aus Stahldrähten
Teil 2. Seile für allgemeine Verwendung

British Standards Institution

Foreword

This Part of BS 302 has been prepared under the direction of the Mechanical Handling Standards Committee. It is one Part of a combined revision of BS 302 : 1968, BS 236 : 1968, BS 329 : 1968, BS 330 : 1968, BS 365 : 1968 and BS 3530 : 1968, which are withdrawn. BS 302 is now published in six Parts and takes account of both national and international developments since 1968.

This Part (Part 2) specifies requirements for general purpose steel wire ropes additional to the general requirements in Part 1. Subsequent Parts specify the additional requirements for other particular uses of ropes:

- Part 3 Specification for zinc coated ropes for ships
- Part 4 Specification for ropes for lifts
- Part 5 Specification for ropes for hauling purposes
- Part 6 Specification for ropes for mine hoisting

Two further Parts are in preparation, covering larger diameter ropes (64 mm to 205 mm diameter) and higher strength ropes and will be Parts 7 and 8 respectively.

In line with the principles of international standard ISO 2408, published by the International Organization for Standardization (ISO), the constructions are grouped according to the number of outer wires in the strands. The general requirements of BS 302 : Part 1 and the methods used for calculating breaking loads and approximate masses are in accordance with ISO 2408. In respect of individual usages the ropes in Parts 2 and 3 are fully in accordance with ISO 2408 and those in section two of Part 4 are in accordance with ISO 4344. In each of these Parts however, certain additional ropes still in common use in the UK have been included.

In line with current international practice, the term 'zinc coated' has been adopted in this standard in place of 'galvanized'. The terms are synonymous.

Purchasers ordering to BS 302 are advised to specify in their purchasing contract that the manufacturer operate a quality system in compliance with the appropriate Part of BS 5750, or suitable equivalent, to ensure themselves that products claimed to comply with BS 302 consistently achieve the required level of quality.

Wire rope users will find valuable information in the companion publication BS 6570 'Code of practice for the selection, care and maintenance of steel wire ropes'.

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

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Specification

1 Scope

This Part of BS 302 specifies the requirements for steel wire ropes for general purposes and is for use in conjunction with Part 1.

NOTE 1. Information to be supplied by the purchaser on the enquiry and order is given in appendix F of BS 302 : Part 1 : 1987.

NOTE 2. The titles of the publications referred to in this standard are listed on the inside back page.

2 Definitions

For the purposes of this Part of BS 302, the definitions given in BS 302 : Part 1 apply.

3 Compliance

Ropes in accordance with BS 302 : Part 2 shall comply with this Part and with BS 302 : Part 1.

4 Wire rope constructions and sizes

Constructions and size ranges shall be as given in table 1.

NOTE. In the absence of a precise indication by the purchaser on the enquiry and order, the choice of construction within a group is at the discretion of the supplier.

5 Material

5.1 Wire

5.1.1 General. The wire used for the manufacture of wire ropes specified in this Part, as shown in table 1, shall comply with sections one and two of BS 2763 : 1982. The mechanical tests shall be confined to the tensile strength and torsion requirements.

5.1.2 Wire finish. The wire shall be bright or class Z zinc coated for all constructions. Zinc coating shall comply with BS 2763.

Table 1. Wire rope constructions and sizes

Rope group	Description	Size range (diameter)	Typical construction
6 x 7	Up to seven outer wires in a strand, one layer of wire over a king wire.	mm 2 to 9	6 x 7 (6/1)
6 x 19	8 to 12 outer wires in a strand, two or three layers over a king wire. Wires equal laid.	3 to 52	6 x 19 (9/9/1)* 6 x 19 (12/6 + 6F/1) 6 x 26 (10/5 and 5/5/1) 6 x 31 (12/6 and 6/6/1)
6 x 36	14 to 18 outer wires in a strand, 3 or more layers of wire over a king wire. Wires equal laid.	9 to 60	6 x 36 (14/7 and 7/7/1) 6 x 41 (16/8 and 8/8/1) 6 x 49 (16/8 and 8/8/8/1)
12 x 6 over 3 x 24	'Paragon' multi-strand. 12 to 18 centreless flat strands each comprising four to six wires cross laid over three oval strands usually of the construction (15/9/FIBRE) over a fibre core.	8 to 32	12 x 6 over 3 x 24
17 x 7 or 18 x 7	17 or 18 strands in rope. Two layers of strand over fibre or steel core.	6 to 26	17 x 7 (6/1) 18 x 7 (6/1)
34 x 7	34 or 36 strands in rope. Three layers of strand over fibre or steel core.	16 to 40	34 x 7 (6/1) 36 x 7 (6/1)
*3 mm to 6 mm ropes in this group are only available as 6 x 19 (12/6/1).			

5.1.3 Tensile grade of wires. For all constructions, all wires except filler wires, king wires and wires forming a steel main core, whether bright or zinc coated, shall be of 1770 N/mm^2 * tensile grade.

5.2 Rope main core

5.2.1 General. The main core of the rope shall be of fibre or steel.

5.2.2 Fibre core. Fibre cores shall comply with 3.2 of BS 302 : Part 1 : 1987.

5.2.3 Steel core. Where a steel core is used, it shall be an independent wire rope (IWRC) for rope sizes of 13 mm diameter and above. For rope sizes smaller than 13 mm diameter the steel core shall be either an IWRC or a wire strand (WSC).

All wires forming a steel main core, except king wires, shall be of one tensile grade.

6 Lay

6.1 Direction of lay

Ropes shall be of right-hand lay or of left-hand lay.

NOTE. For economic reasons right-hand lay is preferred and will be supplied. It will need to be stated by the purchaser on his enquiry and order if a left-hand lay rope is required.

6.2 Type of lay

Round strand ropes shall be either ordinary or Lang's lay. Multistrand ropes shall have either an ordinary or Lang's lay outer layer, with the exception of ropes of Paragon construction which shall have a Lang's lay outer layer.

7 Lubrication

Fibre main cores shall be treated and the wires of the rope shall be coated with a lubricant complying with 3.3 of BS 302 : Part 1 : 1987.

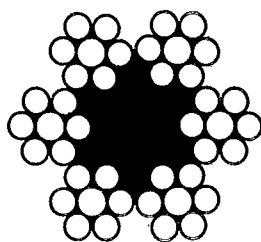
NOTE. The degree and type of lubrication should be agreed between the purchaser and the supplier.

8 Minimum breaking load

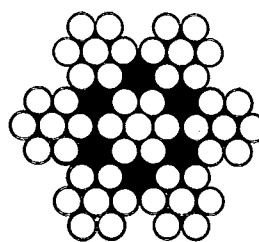
The minimum breaking loads shall be as given in tables 2 to 6.

NOTE. For guidance, these tables also give approximate masses of ropes, calculated as in C.2 of BS 302 : Part 1 : 1987.

Table 2. 6×7 Construction group



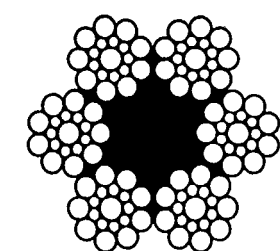
6×7 (6/1) FC



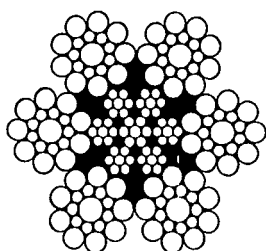
6×7 (6/1) WSC
(sometimes referred to as 7×7)

Nominal diameter	Minimum breaking force (1770 N/mm^2 tensile grade)		Minimum breaking load (1770 N/mm^2 tensile grade)		Approximate mass	
	Fibre cored	Steel cored	Fibre cored	Steel cored	Fibre cored	Steel cored
mm	kN	kN	t	t	kg/100 m	kg/100 m
2	2.35	2.54	0.24	0.26	1.38	1.52
3	5.29	5.72	0.54	0.58	3.11	3.43
4	9.40	10.2	0.96	1.04	5.54	6.10
5	14.7	15.9	1.50	1.62	8.65	9.53
6	21.2	22.9	2.16	2.33	12.5	13.7
7	28.8	31.1	2.94	3.17	17.0	18.7
8	37.6	40.7	3.83	4.15	22.1	24.4
9	47.6	51.5	4.85	5.25	28.0	30.9

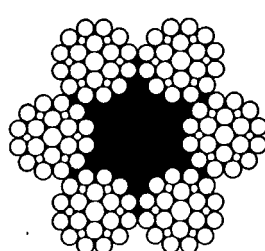
* $1 \text{ N/mm}^2 = 1 \text{ MPa}$.



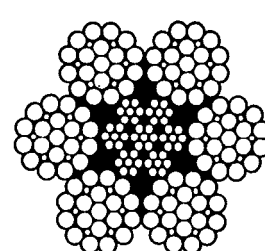
6 x 19 (9/9/1) FC
(6 x 19S)



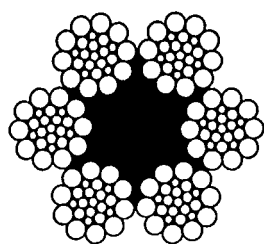
6 x 19 (9/9/1) IWRC



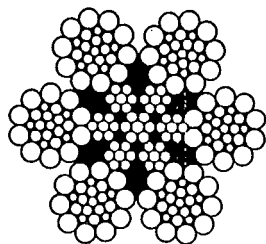
6 x 19 (12/6 + 6F/1) FC
(6 x 19F)



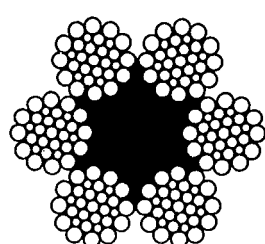
6 x 19 (12/6 + 6F/1) IWRC



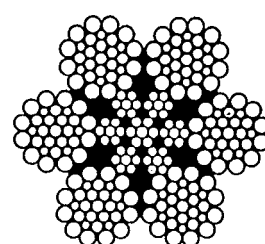
6 x 26
(10/5 and 5/5/1) FC
(6 x 26 WS)



6 x 26
(10/5 and 5/5/1) IWRC

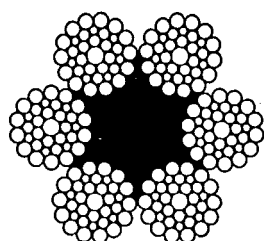


6 x 31
(12/6 and 6/6/1) FC
(6 x 19 WS)

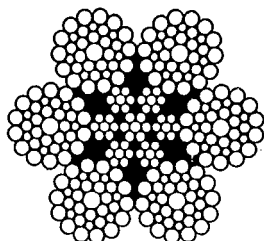


6 x 31
(12/6 and 6/6/1) IWRC

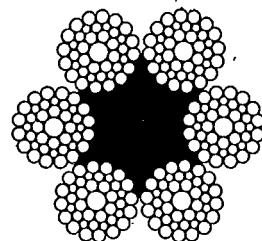
(a) 6 x 19 group



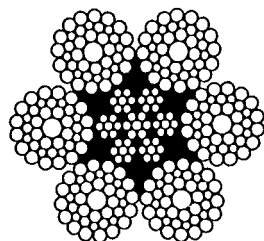
6 x 36 (14/7 and 7/7/1) FC
(6 x 36 WS)



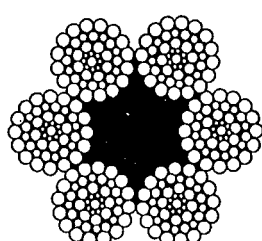
6 x 36 (14/7 and 7/7/1) IWRC



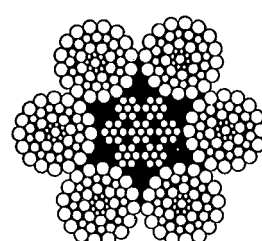
6 x 41 (16/8 and 8/8/1) FC
(6 x 41 WS)



6 x 41 (16/8 and 8/8/1) IWRC



6 x 49 Warrington-Seale
(16/8 and 8/8/8/1) FC



6 x 49 Warrington-Seale
(16/8 and 8/8/8/1) IWRC

(b) 6 x 36 group

Figure 1. 6 x 19 and 6 x 36 construction groups

Table 3. 6 x 19 and 6 x 36 construction groups

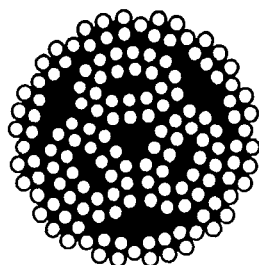
Nominal diameter	Minimum breaking force (1770 N/mm ² tensile grade)		Minimum breaking load (1770 N/mm ² tensile grade)		Approximate mass	
	Fibre cored	Steel cored	Fibre cored	Steel cored	Fibre cored	Steel cored
mm	kN	kN	t	t	kg/100 m	kg/100 m
3	4.89	5.29	0.50	0.54	3.11	3.43
4	8.69	9.4	0.89	0.96	5.54	6.10
5	13.6	14.7	1.39	1.50	8.65	9.53
6	19.6	21.2	2.00	2.16	12.5	13.7
7	28.6	30.9	2.92	3.15	17.7	19.5
8	37.4	40.3	3.81	4.11	23.1	25.5
9	47.3	51.0	4.82	5.20	29.2	32.2
10	58.4	63.0	5.95	6.42	36.1	39.8
11	70.7	76.2	7.21	7.77	43.7	48.2
12	84.1	90.7	8.57	9.25	52.0	57.3
13	98.7	106	10.1	10.8	61.0	67.3
14	114	124	11.6	12.6	70.8	78.0
16	150	161	15.3	16.4	92.4	102
18	189	204	19.3	20.8	117	129
19	211	227	21.5	23.1	130	144
20	234	252	23.9	25.7	144	159
22	283	305	28.8	31.1	175	193
24	336	363	34.3	37.0	208	229
26	395	426	40.3	43.4	244	269
28	458	494	46.7	50.4	283	312
32	598	645	61.0	65.7	370	408
35	716	772	73.0	78.7	442	488
36	757	817	77.2	83.3	468	516
38	843	910	85.9	92.8	521	575
40	935	1008	95.3	103	578	637
44	1131	1220	115	124	699	771
48	1346	1452	137	148	832	917
52	1579	1704	161	174	976	1076
54	1703	1837	174	187	1053	1161
56	1832	1976	187	201	1132	1248
60	2103	2268	214	231	1300	1433

NOTE 1. 3 mm to 8 mm rope is not available in the 6 X 36 construction group.

NOTE 2. 56 mm and 60 mm ropes are only available in the 6 X 36 construction group.

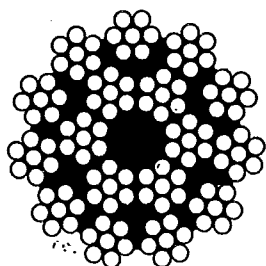
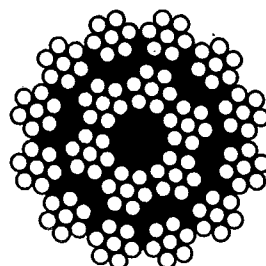
NOTE 3. The values for 3, 4, 5 and 6 mm ropes are based on 6 X 19 cross-lay construction.

Table 4. 12 x 6 over 3 x 24 construction group

12 x 6 over 3 x 24
'Paragon' multi-strand

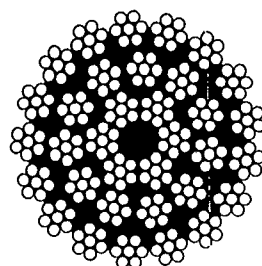
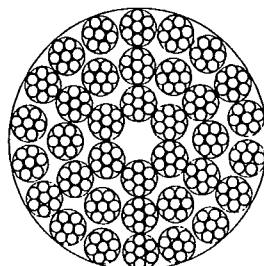
Nominal diameter	Minimum breaking force (1770 N/mm ² tensile grade)	Minimum breaking load (1770 N/mm ² tensile grade)	Approximate mass (fibre cored)
mm	kN	t	kg/100 m
8	34.0	3.47	23.2
9	43.0	4.38	29.3
10	53.1	5.41	36.2
11	64.3	6.55	43.8
12	76.5	7.80	52.1
13	89.7	9.14	61.2
14	104	10.6	71.0
16	136	13.9	92.7
18	172	17.5	117
19	192	19.6	131
20	212	21.6	145
22	257	26.2	175
24	306	31.2	209
26	359	36.6	245
28	416	42.4	284
32	544	55.5	371

Table 5. 17 x 7 and 18 x 7 construction groups with fibre or steel core

17 x 7 (6/1)
Multi-strand18 x 7
Multi-strand

Nominal diameter	Minimum breaking force (1770 N/mm ² tensile grade)	Minimum breaking load (1770 N/mm ² tensile grade)	Approximate mass (fibre cored)
mm	kN	t	kg/100 m
6	20.9	2.13	14.0
7	28.4	2.90	19.1
8	37.2	3.79	25.0
9	47.0	4.79	31.6
10	58.1	5.92	39.0
11	70.2	7.16	47.2
12	83.6	8.52	56.2
13	98.1	10.0	65.9
14	114	11.6	76.4
16	149	15.2	99.8
18	188	19.2	126
19	210	21.4	141
20	232	23.6	156
22	281	28.6	189
24	334	34.0	225
26	392	40.0	264

Table 6. 34 x 7 construction group with fibre or steel core

34 x 7 FC
Multi-strand36 x 7
Multi-strand

Nominal diameter	Minimum breaking force (1770 N/mm ² tensile grade)	Minimum breaking load (1770 N/mm ² tensile grade)	Approximate mass
mm	kN	t	kg/100 m
16	144	14.7	99.8
18	182	18.6	126
19	203	20.7	141
20	225	22.9	156
22	272	27.7	189
24	324	33.0	225
26	380	38.7	264
28	441	45.0	306
32	576	58.7	399
35	690	70.3	478
36	729	74.3	505
38	813	82.9	563
40	901	91.8	624

Publications referred to

- BS 2763 Specification for round carbon steel wire for wire ropes
- BS 5750* Quality systems
Part 2 Specification for manufacture and installation
- BS 6570* Code of practice for the selection, care and maintenance of steel wire ropes
- ISO 2408* Steel wire ropes for general purposes — Characteristics
- ISO 4344* Steel wire ropes for lifts

*Referred to in the foreword only.

BS 302 : Part 2 : 1987

This British Standard, having been prepared under the direction of the Mechanical Handling Standards Committee, was published under the authority of the Board of BSI and comes into effect on 30 June 1987.

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First published, as BS 302, September 1927

First revision, as BS 302 and 621, December 1957

Second revision, as BS 302, May 1968

Third revision, as BS 302 : Part 2, June 1987.

ISBN 0 580 15634 6

The following BSI references relate to the work on this standard:
Committee reference MHE/2 Draft for comment 85/70786 DC

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British Coal
British Ports Association and the National Association of Ports Employers
British Railways Board
British Steel Industry (Wire Section)
Bureau Veritas

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Department of the Environment (Property Services Agency)
Federation of Manufacturers of Construction Equipment and Cranes
Federation of Wire Rope Manufacturers of Great Britain
Health and Safety Executive
Institution of Mechanical Engineers
Institution of Mining Engineers
Institution of Mining and Metallurgy
Ministry of Defence
National Association of Lift Makers
Zinc Development Association

Amendments issued since publication

Amd. No.	Date of issue	Text affected

British Standards Institution · 2 Park Street London W1A 2BS · Telephone 01-629 9000 · Telex 266933

AMD 5874



Amendment No. 1
published and effective from 29 July 1988
to BS 302 : Part 2 : 1987
Stranded steel wire ropes
Part 2. Specification for ropes for general purposes

Revised text

AMD 5874
July 1988

Table 1. Wire rope constructions and sizes
In the footnote delete '9 mm' and substitute '6 mm'.

8807—0—2k—B

MHE/2