

**BSI**

**BS 302 : Part 7 : 1989**

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British Standard

# Stranded steel wire ropes

Part 7. Specification for large diameter ropes for general purposes

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Câbles toronnés en acier

Partie 7. Câbles de grand diamètre d'usage général — Spécifications

Litzenseile aus Stahldrähten

Teil 7. Seile mit großem Durchmesser für allgemeine Zwecke

British Standards Institution

## Foreword

This Part of BS 302 has been prepared under the direction of the Mechanical Handling Standards Policy Committee. Part 7 and Part 8 are new Parts of the BS 302 series, which is itself a combined version of BS 302 : 1968, BS 236 : 1968, BS 329 : 1968, BS 330 : 1968, BS 365 : 1968 and BS 3530 : 1968, which were withdrawn in 1987. BS 302 is now published in eight Parts and takes account of both national and international developments in steel wire ropes since 1968.

This Part specifies requirements for large diameter steel wire ropes that are additional to the general requirements in Part 1. Other Parts specify the additional requirements for other particular uses of ropes:

- Part 2 Specification for ropes for general purposes
- 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
- Part 8 Specification for higher breaking load ropes

In line with the principles of international standard ISO 2408, published by the International Organization for Standardization (ISO), the rope 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 in accordance with ISO 2408 and those in section two of Part 4 in accordance with ISO 4344. In each of these Parts, however, certain additional ropes still in common use in the UK have been included. This Part is technically equivalent to ISO 8369.

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 products to comply with BS 302 are advised to specify in their purchasing contract that the manufacturer operates a quality system complying with the appropriate Part of BS 5750, or suitable equivalent, to assure themselves that the products consistently achieve the required level of quality.

Wire rope users will find valuable information in the companion publication BS 6570.

**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 within the size range 64 mm to 205 mm and is for use in conjunction with BS 302 : Part 1.

The method of calculating the rope breaking load differs from that given in Part 1 and is covered by clause 8 of this Part.

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 cover.

## 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 7 shall comply with this Part and with BS 302 : Part 1.

## 4 Wire rope constructions and sizes

Constructions and size ranges of steel wire ropes 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 rope group is at the discretion of the supplier.

Table 1. Wire rope constructions and sizes		
Rope group	Description	Size range (diameter)
6 x 19	Six strands, 8 to 12 outer wires per strand, two or three layers of wire over a king wire. Wires equal laid (one operation)	mm 64 to 77
8 x 19	Eight strands, 8 to 12 outer wires per strand, two or three layers of wire over a king wire. Wires equal laid (one operation)	64 to 96
6 x 37	Six strands, 14 to 18 outer wires per strand, three or four layers of wire over a king wire. Wires equal laid (one operation)	64 to 115
8 x 37	Eight strands, 14 to 18 outer wires per strand, three or four layers of wire over a king wire. Wires equal laid (one operation)	64 to 141
6 x 61	Six strands, 20 to 24 outer wires per strand, four to six layers of wire over a king wire	90 to 141
8 x 61	Eight strands, 20 to 24 outer wires per strand, four to six layers of wire over a king wire	115 to 180
6 x 91	Six strands, 26 to 30 outer wires per strand, six or more layers of wire over a king wire	103 to 205
8 x 91	Eight strands, 26 to 30 outer wires per strand, six or more layers of wire over a king wire	141 to 205
NOTE 1. Filler wires do not constitute a separate wire layer.		
NOTE 2. The king wire may be replaced by a multi-wire strand. When the king wire is replaced by a strand, it is considered as a single wire and the rope group remains unchanged.		

## 5 Material

### 5.1 Wire

**5.1.1 General.** The wire used for the manufacture of wire ropes, as given 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.

NOTE. The nominal tensile strength of the wire is at the discretion of the rope manufacturer.

**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.

### 5.2 Rope main core

The rope main core shall be of steel and shall be an independent wire rope (IWRC).

## 6 Rope characteristics

### 6.1 General

For the construction groups 6 × 19, 8 × 19, 6 × 37 and 8 × 37 all the wires shall be stranded in one operation.

NOTE. For the construction groups 6 × 61, 8 × 61, 6 × 91 and 8 × 91 more than one operation may be used.

### 6.2 Lay

Ropes shall be ordinary or Lang's lay, and right- or left-handed.

## 7 Lubrication

The rope shall be lubricated in stranding.

NOTE. In the absence of a precise indication by the purchaser the type of lubricant and lubrication is at the discretion of the manufacturer.

## 8 Minimum breaking load

Minimum breaking loads shall be as given in table 2 and the minimum breaking force,  $F_0$ , in kilonewtons, shall be calculated as follows:

$$F_0 = K_3 d^2$$

where

$d$  is the nominal diameter of the rope (in mm);

$K_3$  is the empirical factor depending on the size of the rope as given below:

$$64 \text{ mm to } 103 \text{ mm: } K_3 = 0.726 - 0.00108d$$

$$109 \text{ mm to } 154 \text{ mm: } K_3 = 0.686 - 0.00078d$$

$$167 \text{ mm to } 205 \text{ mm: } K_3 = 0.652 - 0.00075d$$

NOTE 1. The minimum breaking force ( $F_0$ ) is converted to minimum breaking load by dividing by 9.81.

NOTE 2. For guidance, table 2 also gives the approximate masses of ropes, calculated as described in C.2 of BS 302 : Part 1 : 1987.

**Table 2. Strength of rope of all construction groups**

Nominal diameter ( $d$ )	Minimum breaking force	Minimum breaking load	Approximate mass
mm	kN	t	kg/100 m
64	2 690	274	1 700
67	2 930	299	1 860
71	3 270	333	2 090
74	3 540	361	2 270
77	3 810	389	2 460
80	4 090	417	2 660
83	4 380	447	2 860
87	4 780	487	3 140
90	5 090	519	3 360
96	5 740	585	3 820
103	6 520	665	4 400
109	7 140	728	4 930
115	7 890	805	5 490
122	8 790	896	6 180
128	9 600	979	6 800
135	10 580	1079	7 560
141	11 450	1168	8 250
148	12 500	1275	9 090
154	13 420	1368	9 840
167	14 690	1498	11 570
180	16 750	1708	13 450
192	18 730	1910	15 300
205	20 940	2135	17 440

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### Publications referred to

- BS 302 Stranded steel wire ropes  
Part 1 Specification for general requirements  
\*Part 2 Specification for ropes for general purposes  
\*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  
\*Part 8 Specification for higher breaking load ropes
- BS 2763 Specification for round carbon steel wire for wire ropes
- \*BS 5750 Quality systems
- \*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
- \*ISO 8369 Large diameter steel wire ropes

\*Referred to in the foreword only.

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The preparation of this British Standard was entrusted by the Mechanical Handling Standards Policy Committee (MHE/-) to Technical Committee MHE/2, upon which the following bodies were represented:

Associated Offices Technical Committee  
Association of Supervisory and Executive Engineers  
British Coal Corporation  
British Ports Association and the National Association of Ports Employers  
British Steel Industry (Wire Section)  
Bureau Veritas  
Chain Testers' Association of Great Britain

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 and Metallurgy  
Institution of Mining Engineers  
Lloyds' Register of Shipping  
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