
INTERNATIONAL STANDARD



2408

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Steel wire ropes for general purposes — Characteristics

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FOREWORD

ISO (the International Organization for Standardization) is a worldwide federation of national standards institutes (ISO Member Bodies). The work of developing International Standards is carried out through ISO Technical Committees. Every Member Body interested in a subject for which a Technical Committee has been set up has the right to be represented on that Committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work.

Draft International Standards adopted by the Technical Committees are circulated to the Member Bodies for approval before their acceptance as International Standards by the ISO Council.

International Standard ISO 2408 was drawn up by Technical Committee ISO/TC 105, *Steel wire ropes*.

It was approved in December 1971 by the Member Bodies of the following countries :

Austria	Ireland	Spain
Belgium	Israel	Sweden
Chile	Italy	Switzerland
Denmark	Netherlands	Thailand
Egypt, Arab Rep. of	Norway	United Kingdom
France	Pakistan	U.S.S.R.
Germany	Portugal	
India	South Africa, Rep. of	

The Member Body of the following country expressed disapproval of the document on technical grounds :

New Zealand

Steel wire ropes for general purposes – Characteristics

1 SCOPE AND FIELD OF APPLICATION

This International Standard specifies the most commonly used wire ropes for general purposes, selected from a great number of possible rope constructions.

The following types of wire ropes are not covered by this International Standard :

- ropes for mining purposes;
- ropes for aircraft controls;
- ropes for deep drilling equipment;
- ropes for aerial ropeways and funiculars;

- ropes for lifts and elevators;
- ropes for prestressed concrete.

2 REFERENCES

ISO 2232, *Drawn wire for general purpose non-alloy steel wire ropes – Specifications.*

ISO 3108, *Steel wire ropes for general purposes – Determination of breaking load.* (At present at the stage of draft.)

ISO . . . , *Steel wire ropes for general purposes – Terms of acceptance.* (At present at the stage of draft proposal.)

3 TYPES OF CONSTRUCTION AND DIAMETER RANGES – ROUND STRAND

TABLE 1

Rope designation	Rope construction	Type of main core	Available diameter range mm
3.1 6-Stranded ropes			
6 × 7	6 (6 + 1)	fibre or steel	2 to 36
6 × 19	6 (12 + 6 + 1)	fibre steel	3 to 44 8 to 48
6 × 37	6 (18 + 12 + 6 + 1)	fibre	6 to 56
6 × 19 Seale	6 (9 + 9 + 1)	fibre or steel	8 to 36
6 × 19 Filler	6 (12 + 6F + 6 + 1)	fibre or steel	8 to 36
6 × 26 Warrington-Seale	6 (10 + 5/5 + 5 + 1)	fibre or steel	9 to 40
6 × 31 Warrington-Seale	6 (12 + 6/6 + 6 + 1)	fibre or steel	11 to 40
6 × 36 Warrington-Seale	6 (14 + 7/7 + 7 + 1)	fibre or steel	13 to 56
6 × 41 Warrington-Seale	6 (16 + 8/8 + 8 + 1)	fibre or steel	16 to 60
6 × 12	6 (12 + FC)	fibre	8 to 32
6 × 24	6 (15 + 9 + FC)	fibre	8 to 40
3.2 8-Stranded ropes			
8 × 19 Seale	8 (9 + 9 + 1)	fibre or steel	8 to 36
8 × 19 Filler	8 (12 + 6F + 6 + 1)	fibre or steel	8 to 36
3.3 Multi-strand ropes			
17 × 7 18 × 7	11 (6 + 1) + 6 (6 + 1) 12 (6 + 1) + 6 (6 + 1)	fibre or steel	8 to 28
34 × 7 36 × 7	17 (6 + 1) + 11 (6 + 1) + 6 (6 + 1) 18 (6 + 1) + 12 (6 + 1) + 6 (6 + 1)	fibre or steel	12 to 40

3.4 Increments of diameters

The increments of diameters referred to in this International Standard were arrived at by giving due consideration to the practical requirements of the users.

4 MATERIALS

The materials used in the manufacture of these ropes are described in the following clauses : the information is given for general interest only. Materials requirements are part of the terms of acceptance of the rope and will be the subject of a separate International Standard.

4.1 Rope wire

The wire used for the manufacture of these ropes shall comply with the requirements of ISO 2232.

4.1.1 Tensile grade of wire

The wire tensile grades shall be

1 570 N/mm² (160 kgf/mm²)

1 770 N/mm² (180 kgf/mm²)

For shipping, fishing and inland waterway rope requirements, the 1 420 N/mm² (145 kgf/mm²) tensile grade of wire may also be used.

4.1.2 Surface finish of wire

The wire shall be either bright or galvanized. If galvanized it shall be B quality.

For shipping, fishing and inland waterway rope requirements, the galvanizing may be quality A or AB.

TABLE 2

Surface finish of wire	Tensile grades N/mm ²			Remarks
	1 420	1 570	1 770	
bright		1 570	1 770	Only for shipping, fishing and inland waterway ropes
galvanized quality B		1 570	1 770	
galvanized quality AB	1 420	1 570	1 770	
galvanized quality A	1 420	1 570		

4.2 Cores

4.2.1 Fibre cores (FC)

Main and strand cores shall be manufactured from the following materials :

- natural hard fibre (NF) (e.g. manila, sisal);
- natural soft fibre (NF) (e.g. hemp, jute, cotton);

- man-made fibre (SF) (e.g. polyamide, polyethylene, polypropylene).

4.2.2 Steel main core

The steel core shall normally be an independent wire rope (WR).

Wire strand cores (WS) may be used for certain constructions of rope up to, but not including, 13 mm diameter, as well as for 6 X 7 and 6 X 19 ropes for shipping purposes and for multi-strand ropes.

The wires in a steel core shall normally be of similar tensile strength to that of the main strand. Lower tensile strength wires are permitted.

4.3 Rope lubricant

The lubricants for these wire ropes shall be selected to reduce the friction in the rope, to provide protection of the steel wires against corrosion and to protect the fibre core against deterioration.

The lubricant shall be free from acid or marked alkali and shall have no injurious effect on the steel wire or on the fibres in the rope.

5 ROPE CHARACTERISTICS

5.1 Strand

5.1.1 The strand shall be uniformly made and be free from slack wires.

5.1.2 The length of lay of the individual layers of like wires in a strand shall not vary significantly.

5.1.3 All wires of a strand made in equal lay construction shall be stranded in one operation.

5.1.4 King wires and fibre cores of strands shall be of a size to provide sufficient support to enable the covering wires to be evenly laid.

5.2 Rope

5.2.1 The rope shall be uniformly made and the strands shall lie tightly on the core or the underlying strands. When uncoiled and under no load the rope shall not be wavy.

5.2.2 The length of lay of the individual layers of like strands in a rope shall not vary significantly.

5.2.3 In a new rope, clearances between the strands are recommended as a general rule.

5.2.4 In galvanized ropes, all the wires shall be galvanized, including those of the steel core, where applicable.

5.2.5 Wires over 0,4 mm diameter shall be joined by brazing or welding. Wires up to and including 0,4 mm diameter may be joined by brazing, welding, or twisting.

5.2.6 The free ends of all wire ropes shall be secured against untwisting.

5.3 Rope lubrication

Wire ropes shall be thoroughly lubricated, unless otherwise specified by the purchaser.

5.4 Rope diameter

5.4.1 Nominal diameter *d* (expressed in millimetres)

The nominal rope diameter shall be that by which the rope is designated.

5.4.2 Measured (actual) diameter

The measured (actual) rope diameter shall be that obtained by measuring the rope by the method described in ISO . . .

5.4.3 Tolerance

The actual rope diameter shall be within the tolerances of the nominal diameter specified in Table 3.

TABLE 3

Nominal diameter <i>d</i>	Tolerance of the nominal diameter	
	ropes with strands exclusively of wire	ropes with fibre strand cores
mm	%	%
2 and 3	+ 7 - 1	-
4 and 5	+ 6 - 1	+ 8 - 1
6 and 7	+ 5 - 1	+ 7 - 1
8 and more	+ 4 - 1	+ 6 - 1

For ropes with diameters from 2 to 5 mm the permitted tolerance shall be rounded up to the nearest 0,05 mm.

5.5 Length (expressed in metres)

The length of rope supplied shall be that given on the order subject to the following tolerances :

up to and including 400 m : + $\frac{5}{0}$ %

over 400 m : + $\frac{20}{0}$ m for each 1 000 m or part thereof.

The rope length shall be measured under no load.

Ropes required with smaller tolerance, for example ropes fitted with a terminal at each end, shall be the subject of special agreement between purchaser and manufacturer.

For the length of test pieces see ISO 3108.

5.6 Mass *M* (expressed in kilograms per 100 m)

The approximate rope mass is calculated as follows :

$$M = Kd^2$$

where

M is the approximate mass per unit length of the rope, in kilograms per 100 m;

d is the nominal diameter of the rope, in millimetres;

K is the empirical factor for the mass per unit length for a given rope construction, in kg/(100 m·mm²).

The values for *K* shown in Table 4 are for fully lubricated ropes. Ropes which are not fully lubricated may be lighter.

In Table 4 :

*K*_{1n} is the factor for natural fibre cored ropes,

*K*_{1p} the factor for polypropylene fibre cored ropes, and

*K*₂ the factor for steel cored ropes.

In Tables 5 to 16 :

*M*_{1n} is the approximate mass for natural fibre cored ropes, and

*M*₂ the approximate mass for steel cored ropes.

5.7 Minimum breaking load *F*₀ (expressed in kilonewtons)

The minimum breaking load is the load which shall be reached at least in the tensile test to destruction according to ISO 3108.

It is calculated as follows :

$$F_0 = \frac{K'd^2R_0}{1\ 000}$$

where

*F*₀ is the minimum breaking load, in kilonewtons;

d is the nominal diameter of the rope, in millimetres;

*R*₀ is the tensile grade of wire, in newtons per square millimetre;

K' is the empirical factor for the minimum breaking load for a given rope construction.

The values of *K'* are given in Table 4.

In Table 4 :

*K'*₁ is the factor for fibre cores ropes, and

*K'*₂ the factor for steel cored ropes.

In Tables 5 to 16 :

F_{01} is the minimum breaking load for fibre cored ropes, and

F_{02} the minimum breaking load for steel cored ropes.

The breaking load figures for ropes with steel cores shown in the tables are calculated on the assumption that the steel

core has a tensile strength similar to that of the wires of the other strands.

In the case where the tensile grade of the steel cores is different from that of the wires in the other strands, the minimum breaking load shall be agreed by the manufacturer and purchaser.

5.8 Numerical values of factors K and K'

TABLE 4

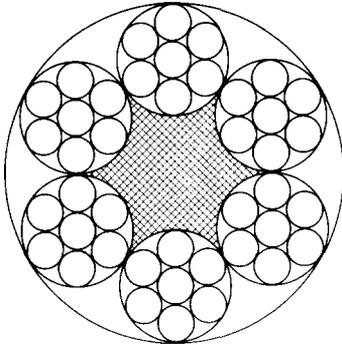
1 Rope designation	2 Rope mass factor			5 $\frac{K_2}{K_{1n}}$	6 $\frac{K_2}{K_{1p}}$	7 Minimum breaking load factor		9 $\frac{K'_2}{K'_1}$
	natural fibre cored ropes	polypropylene fibre cored ropes ¹⁾	steel cored ropes			fibre cored ropes	steel cored ropes	
	K_{1n}	K_{1p}	K_2			K'_1	K'_2	
	kg/(100 m·mm ²)					—		
6 X 7	0,357 4	0,348 5	0,393 1	1,10	1,135	0,332 2	0,358 8	1,08
6 X 19 6 X 37	0,346 0	0,337 4	0,380 6	1,10 —	1,135 —	0,307 3 0,294 8	0,331 9 —	1,08 —
6 X 19 Seale 6 X 19 Filler	0,372 6 0,380 2	0,363 3 0,370 7	0,409 9 0,418 2	1,10 1,10	1,135 1,135	0,330 9 0,337 7	0,357 4 0,364 7	1,08 1,08
6 X 26 Warrington-Seale 6 X 31 Warrington-Seale 6 X 36 Warrington-Seale 6 X 41 Warrington-Seale	0,380 2	0,370 7	0,418 2	1,10	1,135	0,329 9	0,356 3	1,08
6 X 12 6 X 24	0,250 6 0,318 4	0,230 6 0,304 1	— —	— —	— —	0,208 6 0,280 2	— —	— —
8 X 19 Seale 8 X 19 Filler	0,348 4 0,356 5	0,336 2 0,344 0	0,425 2 0,434 9	1,22 1,22	1,28 1,28	0,287 0 0,293 6	0,338 6 0,346 4	1,18 1,18
17 X 7 and 18 X 7 34 X 7 and 36 X 7	0,382 8 0,390 2	0,379 0 0,386 3	0,401 9 0,401 9	1,05 1,03	1,06 1,035	0,318 6 0,312 2	0,328 1 0,318 4	1,03 1,02

1) The practice of using man-made fibre cores is developing. Experience to date exists only with polypropylene.

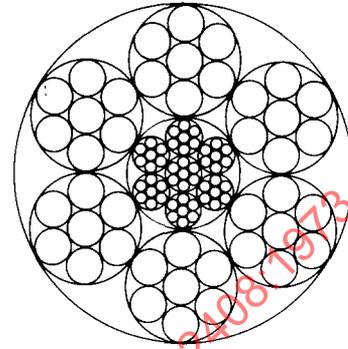
6 TABLES OF PHYSICAL PROPERTIES

6.1 Wire rope 6 × 7

Construction of the strand : 6 + 1



with fibre core (FC)



with steel core (WR)

TABLE 5

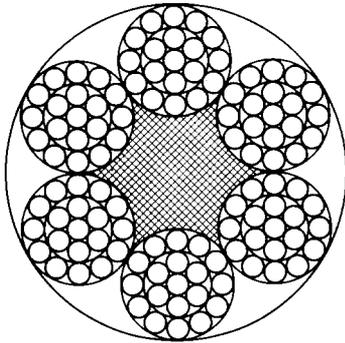
1	2	3		4		5		6		7		8		9		10	
		Approximate mass		Minimum breaking load of the rope, corresponding to a tensile grade R_0 of the wires of													
		natural fibre cored ropes	steel cored ropes	1 420 N/mm ² *		1 570 N/mm ²		1 770 N/mm ²									
				fibre cored ropes	steel cored ropes	fibre cored ropes	steel cored ropes	fibre cored ropes	steel cored ropes	fibre cored ropes	steel cored ropes						
d	Tol.	M_{1n}	M_2	F_{01}	F_{02}	F_{01}	F_{02}	F_{01}	F_{02}	F_{01}	F_{02}						
mm	%	kg/100 m	kg/100 m	kN	kN	kN	kN	kN	kN	kN	kN						
2	} + 7 - 1	1,43	1,57	—	—	—	—	—	—	2,35	2,54						
3		3,22	3,54	—	—	—	—	—	—	5,29	5,72						
4	} + 6 - 1	5,72	6,29	—	—	—	—	—	—	9,41	10,2						
5		8,94	9,83	—	—	—	—	—	—	14,7	15,9						
6	} + 5 - 1	12,9	14,2	—	—	—	—	—	—	21,2	22,9						
7		17,5	19,3	—	—	—	—	—	—	28,8	31,1						
8	} + 4 - 1	22,9	25,2	30,2	32,6	33,4	36,1	37,6	40,6								
9		28,9	31,8	38,2	41,3	42,2	45,6	47,6	51,4								
10		35,7	39,3	47,2	50,9	52,2	56,3	58,8	63,5								
11		43,2	47,5	57,1	61,6	63,1	68,2	71,1	76,8								
12		51,5	56,7	67,9	73,4	75,1	81,1	84,7	91,5								
13		60,4	66,4	79,7	86,1	88,1	95,2	99,4	107								
14		70,1	77,1	92,5	99,9	102	110	115	124								
16		91,5	101	121	130	134	144	151	163								
18		116	128	153	165	169	183	191	206								
20		143	157	189	204	209	225	235	254								
22	173	190	228	247	252	273	285	307									
24	206	227	272	293	300	324	339	366									
26	242	266	319	344	353	381	397	429									
28	280	308	370	399	409	442	461	498									
32	366	403	483	522	534	577	602	650									
36	463	509	611	660	676	730	762	823									

Surface finish of the wires : see 4.1.2.

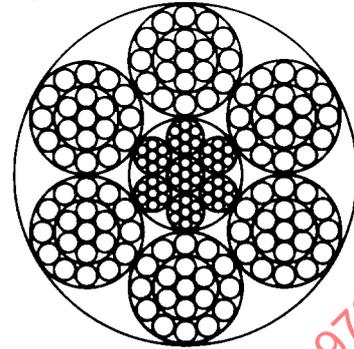
* Grade 1 420 N/mm² is only to be used for certain shipping, fishing and inland waterway requirements (see 4.1.1).

6.2 Wire rope 6 X 19

Construction of the strand : 12 + 6 + 1



with fibre core (FC)



with steel core (WR)

TABLE 6

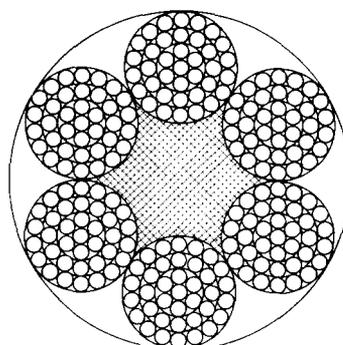
1	2	3	4	Minimum breaking load of the rope, corresponding to a tensile grade R_0 of the wires of				
				Approximate mass		1 420 N/mm ² *		1 770 N/mm ²
				natural fibre cored ropes	steel cored ropes	fibre cored ropes	steel cored ropes	fibre cored ropes
d	Tol.	M_{1n}	M_2	F_{01}	F_{02}	F_{01}	F_{02}	F_{01}
mm	%	kg/100 m	kg/100 m	kN	kN	kN	kN	kN
3	+7 -1	3,11	—	—	—	—	—	4,90
4 5	+6 -1	5,54 8,65	—	—	—	—	—	8,70 13,6
6 7	+5 -1	12,5 17,0	— —	— —	— —	— —	— —	19,6 26,7
8		22,1	24,4	27,9	30,2	30,9	33,3	34,8
9		28,0	30,8	35,3	38,2	39,1	42,2	44,1
10		34,6	38,1	43,6	47,1	48,2	52,1	54,4
11		41,9	46,1	52,8	57,0	58,4	63,1	65,8
12		49,8	54,8	62,8	67,9	69,5	75,0	78,3
13		58,5	64,3	73,7	79,6	81,5	88,1	91,9
14		67,8	74,6	85,5	92,4	94,6	102	107
16		88,6	97,4	112	121	124	133	139
18		112	123	141	153	156	169	176
20	+4 -1	138	152	175	189	193	208	218
22		167	184	211	228	234	252	263
24		199	219	251	271	278	300	313
26		234	257	295	319	326	352	368
28		271	298	342	369	378	409	426
32		354	390	447	483	494	534	557
36		448	493	566	611	625	675	705
40		554	609	698	754	772	834	870
44		670	737	845	912	934	1 010	1 050
48		—	877	—	1 090	—	1 200	—

Surface finish of the wires : see 4.1.2.

* Grade 1 420 N/mm² is only to be used for certain shipping, fishing and inland waterway requirements (see 4.1.1).

6.3 Wire rope 6 × 37

Construction of the strand : 18 + 12 + 6 + 1



with fibre core (FC)

TABLE 7

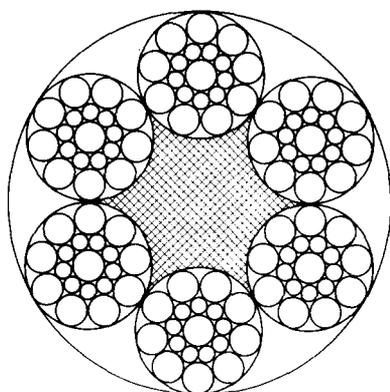
1	2	3	4	5	6
Nominal diameter		Approximate mass	Minimum breaking load of the rope, corresponding to a tensile grade R_0 of the wires of		
		natural fibre cored ropes	1 420 N/mm ² *	1 570 N/mm ²	1 770 N/mm ²
d	Tol.	M_{1n}	F_{01}	F_{01}	F_{01}
mm	%	kg/100 m	kN	kN	kN
6	} + 5 - 1	12,5	—	—	18,8
7		17,0	—	—	25,6
8		22,1	26,8	29,6	33,4
9		28,0	33,9	37,5	42,3
10		34,6	41,9	46,3	52,2
11		41,9	50,7	56,0	63,1
12		49,8	60,3	66,6	75,1
13		58,5	70,7	78,2	88,2
14		67,8	82,0	90,7	102
16		88,6	107	118	134
18		112	136	150	169
20		+ 4 - 1	138	167	185
22	167		203	224	253
24	199		241	267	301
26	234		283	313	353
28	271		328	363	409
32	354		429	474	534
36		448	543	600	676
40		554	670	741	835
44		670	810	896	1 010
48		797	964	1 070	1 200
52		936	1 130	1 250	1 410
56		1 090	1 310	1 450	1 640

Surface finish of the wires : see 4.1.2.

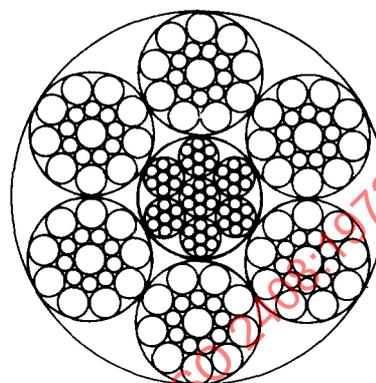
* Grade 1 420 N/mm² is only to be used for certain shipping, fishing and inland waterway requirements (see 4.1.1).

6.4 Wire rope 6 X 19 Seale

Construction of the strand : 9 + 9 + 1



with fibre core (FC)



with steel core (WR)

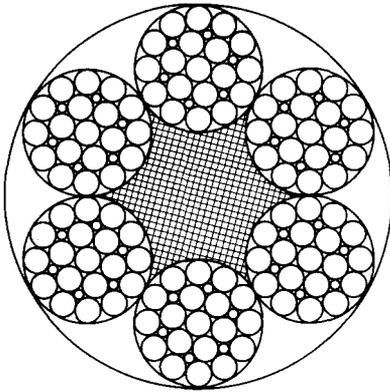
TABLE 8

1	2	3		4		5		6		7		8	
		Approximate mass				Minimum breaking load of the rope, corresponding to a tensile grade R_0 of the wires of							
						1 570 N/mm ²		1 770 N/mm ²					
Nominal diameter		natural fibre cored ropes	steel cored ropes	fibre cored ropes	steel cored ropes	fibre cored ropes	steel cored ropes						
d	Tol.	M_{1n}	M_2	F_{01}	F_{02}	F_{01}	F_{02}						
mm	%	kg/100 m	kg/100 m	kN	kN	kN	kN						
8		23,8	26,2	33,2	35,9	37,5	40,5						
9		30,2	33,2	42,1	45,5	47,4	51,2						
10		37,3	41,0	52,0	56,1	58,6	63,3						
11		45,1	49,6	62,9	67,9	70,9	76,5						
12		53,7	59,0	74,8	80,8	84,3	91,1						
13		63,0	69,3	87,8	94,8	99,0	107						
14		73,0	80,3	102	110	115	124						
16	+ 4	95,4	105	133	144	150	162						
18	- 1	121	133	168	182	190	205						
20		149	164	208	224	234	253						
22		180	198	251	272	283	306						
24		215	237	299	323	337	364						
26		252	277	351	379	396	428						
28		292	321	407	440	459	496						
32		382	420	532	575	600	648						
36		483	531	673	727	759	820						

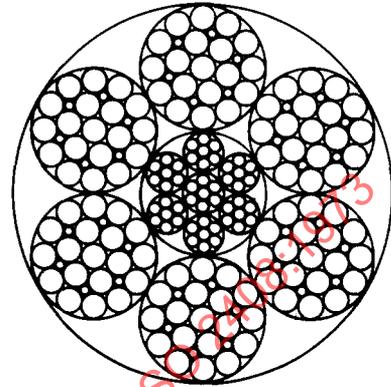
Surface finish of the wires : see 4.1.2.

6.5 Wire rope 6 X 19 Filler

Construction of the strand : 12 + 6F + 6 + 1



with fibre core (FC)



with steel core (WR)

TABLE 9

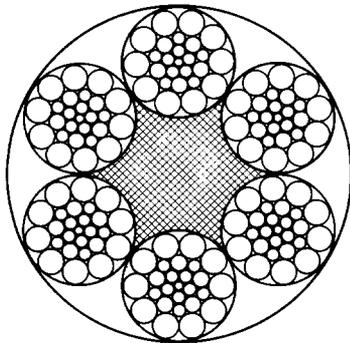
1 Nominal diameter	2 Tol.	3 Approximate mass		5 Minimum breaking load of the rope, corresponding to a tensile grade R_0 of the wires of			
		natural fibre cored ropes	steel cored ropes	1 570 N/mm ²		1 770 N/mm ²	
				fibre cored ropes	steel cored ropes	fibre cored ropes	steel cored ropes
d mm	%	M_{1n} kg/100 m	M_2 kg/100 m	F_{01} kN	F_{02} kN	F_{01} kN	F_{02} kN
8		24,3	26,7	33,9	36,6	38,3	41,3
9		30,8	33,9	42,9	46,4	48,4	52,3
10		38,0	41,8	53,0	57,3	59,8	64,6
11		46,0	50,6	64,2	69,3	72,3	78,1
12		54,7	60,2	76,3	82,5	86,1	93,0
13		64,3	70,7	89,6	96,8	101	109
14		74,5	82,0	104	112	117	127
16	+ 4	97,3	107	136	147	153	165
18	- 1	123	135	172	186	194	209
20		152	167	212	229	239	258
22		184	202	257	277	289	312
24		219	241	305	330	344	372
26		257	283	358	387	404	436
28		298	328	416	449	469	506
32		389	428	543	586	612	661
36		493	542	687	742	775	837

Surface finish of the wires : see 4.1.2.

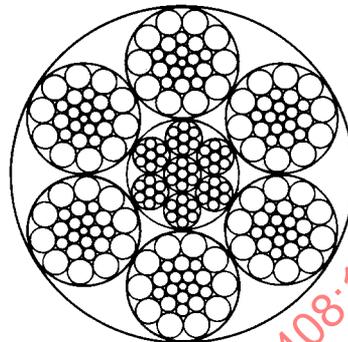
6.6 Wire rope 6 × 26 Warrington-Seale (Table 10)

Diameter range : 9 to 40 mm

Construction of the strand : 10 + 5/5 + 5 + 1



with fibre core (FC)

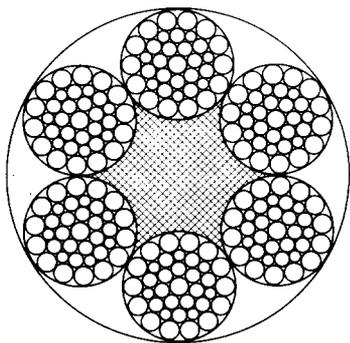


with steel core (WR)

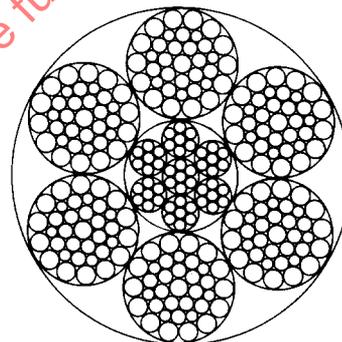
6.7 Wire rope 6 × 31 Warrington-Seale (Table 10)

Diameter range : 11 to 40 mm

Construction of the strand : 12 + 6/6 + 6 + 1



with fibre core (FC)

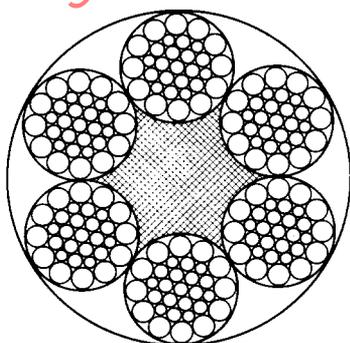


with steel core (WR)

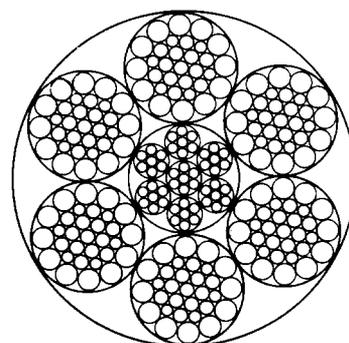
6.8 Wire rope 6 × 26 Warrington-Seale (Table 10)

Diameter range : 13 to 56 mm

Construction of the strand : 14 + 7/7 + 7 + 1



with fibre core (FC)

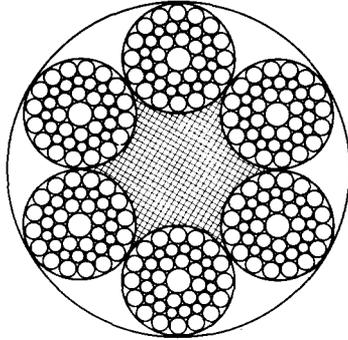


with steel core (WR)

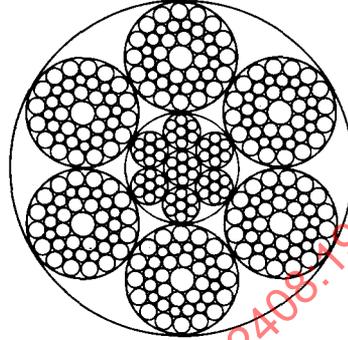
6.9 Wire rope 6 × 41 Warrington-Seale (Table 10)

Diameter range : 16 to 60 mm

Construction of the strand : 16 + 8/8 + 8 + 1



with fibre core (FC)



with steel core (WR)

TABLE 10

1	2	3		4		5		6		7		8	
		Approximate mass				Minimum breaking load of the rope, corresponding to a tensile grade R_0 of the wires of		1 570 N/mm ²		1 770 N/mm ²			
Nominal diameter		natural fibre cored ropes	steel cored ropes	fibre cored ropes	steel cored ropes	fibre cored ropes	steel cored ropes	fibre cored ropes	steel cored ropes	fibre cored ropes	steel cored ropes	fibre cored ropes	steel cored ropes
d	Tol.	M_{1n}	M_2	F_{01}	F_{02}	F_{01}	F_{02}	F_{01}	F_{02}	F_{01}	F_{02}	F_{01}	F_{02}
mm	%	kg/100 m	kg/100 m	kN	kN	kN	kN	kN	kN	kN	kN	kN	kN
9		30,8	33,9	42,0	45,3	47,3	51,1						
10		38,0	41,8	51,8	55,9	58,4	63,1						
11		46,0	50,6	62,7	67,7	70,7	76,3						
12		54,7	60,2	74,6	80,6	84,1	90,8						
13		64,3	70,7	87,5	94,5	98,7	107						
14		74,5	82,0	102	110	114	124						
16		97,3	107	133	143	149	161						
18		123	135	168	181	189	204						
20		152	167	207	224	234	252						
22		184	202	251	271	283	305						
24	+ 4	219	241	298	322	336	363						
26	- 1	257	283	350	378	395	426						
28		298	328	406	439	458	494						
32		389	428	530	573	598	646						
36		493	542	671	725	757	817						
40		608	669	829	895	934	1 010						
44		736	810	1 000	1 080	1 130	1 220						
48		876	964	1 190	1 290	1 350	1 450						
52		1 030	1 130	1 400	1 510	1 580	1 710						
56		1 190	1 310	1 620	1 750	1 830	1 980						
60		1 370	1 510	1 860	2 010	2 100	2 270						

Surface finish of the wires : see 4.1.2.

6.10 Wire rope 6 × 12

Construction of the strand : 12 + FC

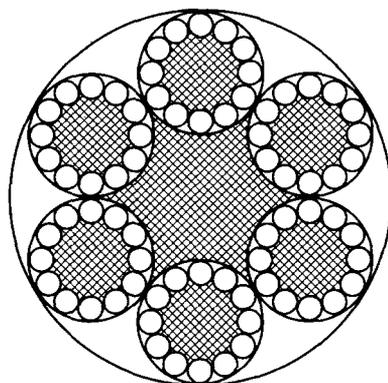


TABLE 11

1		2		3		4		5	
Nominal diameter		Tol.		Approximate mass		Minimum breaking load of the rope, corresponding to a tensile grade R_0 of the wires of			
				natural fibre cored ropes		1 420 N/mm ² *		1 570 N/mm ²	
d				M_{1n}		F_{01}		F_{01}	
mm		%		kg/100 m		kN		kN	
8				16,0		19,0		21,0	
9				20,3		24,0		26,5	
10				25,1		29,6		32,8	
11				30,3		35,8		39,6	
12				36,1		42,7		47,2	
13				42,4		50,1		55,3	
14				49,1		58,1		64,2	
16		+ 6		64,2		75,8		83,8	
18		- 1		81,2		96,0		106	
20				100		118		131	
22				121		143		159	
24				144		171		189	
26				169		200		221	
28				196		232		257	
32				257		303		335	

Surface finish of the wires : see 4.1.2.

* Grade 1 420 N/mm² is only to be used for certain shipping, fishing and inland waterway requirements (see 4.1.1).

6.11 Wire rope 6 × 24

Construction of the strand : 15 + 9 + FC

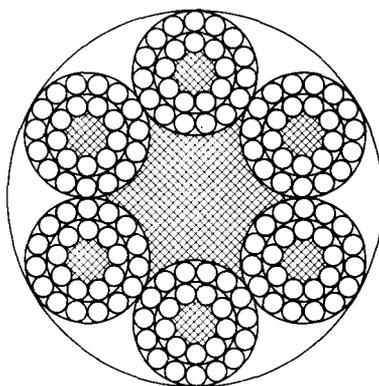


TABLE 12

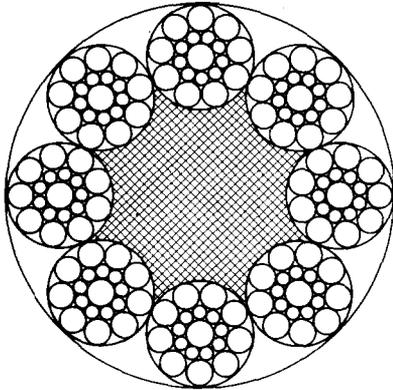
1 Nominal diameter	2 Tol.	3 Approximate mass natural fibre cored ropes M_{1n}	4 Minimum breaking load of the rope, corresponding to a tensile grade R_0 of the wires of		5
			1 420 N/mm ² *	1 570 N/mm ²	
d	%	kg/100 m	F_{01}	F_{01}	
mm			kN	kN	
8	+ 6 - 1	20,4	25,5	28,2	
9		25,8	32,2	35,6	
10		31,8	39,8	44,0	
11		38,5	48,1	53,2	
12		45,8	57,3	63,3	
13		53,8	67,2	74,3	
14		62,4	78,0	86,2	
16		81,5	102	113	
18		103	129	143	
20		127	159	176	
22		154	193	213	
24		183	229	253	
26		215	269	297	
28		250	312	345	
32		326	407	450	
36		413	516	570	
40		509	637	704	

Surface finish of the wires : see 4.1.2.

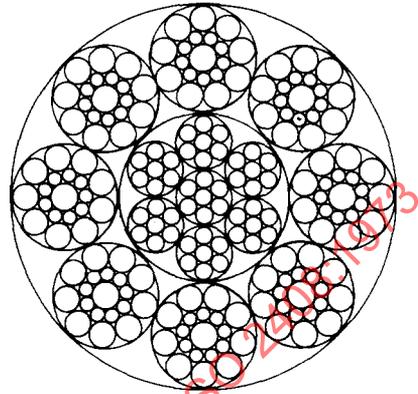
* Grade 1 420 N/mm² is only to be used for certain shipping fishing and inland waterway requirements (see 4.1.1).

6.12 Wire rope 8 × 19 Seale

Construction of the strand : 9 + 9 + 1



with fibre core (FC)



with steel core (WR)

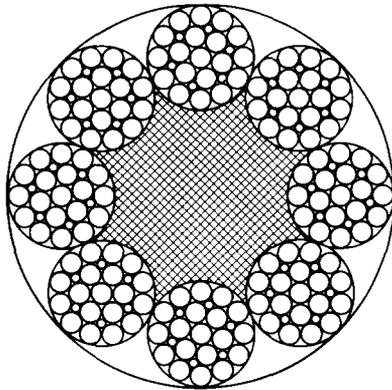
TABLE 13

1		2		3		4		5		6		7		8	
Nominal diameter		Approximate mass				Minimum breaking load of the rope, corresponding to a tensile grade R_0 of the wires of									
		natural fibre cored ropes		steel cored ropes		1 570 N/mm ²		1 770 N/mm ²							
d	Tol.	M_{1n}	M_2	F_{01}	F_{02}	F_{01}	F_{02}	F_{01}	F_{02}	F_{01}	F_{02}	F_{01}	F_{02}	F_{01}	F_{02}
mm	%	kg/100 m	kg/100 m	kN	kN	kN	kN	kN	kN	kN	kN	kN	kN	kN	kN
8		22,3	27,2	28,8	34,0	32,5	38,4								
9		28,2	34,4	36,5	43,1	41,1	48,5								
10		34,8	42,5	45,1	53,2	50,8	59,9								
11		42,2	51,4	54,5	64,3	61,5	72,5								
12		50,2	61,2	64,9	76,6	73,2	86,3								
13		58,9	71,9	76,1	89,8	85,9	101								
14		68,3	83,3	88,3	104	99,6	117								
16	+ 4	89,2	109	115	136	130	153								
18	- 1	113	138	146	172	165	194								
20		139	170	180	213	203	240								
22		169	206	218	257	246	290								
24		201	245	260	306	293	345								
26		236	287	305	359	343	405								
28		273	333	353	417	398	470								
32		357	435	461	544	520	614								
36		452	551	584	689	658	777								

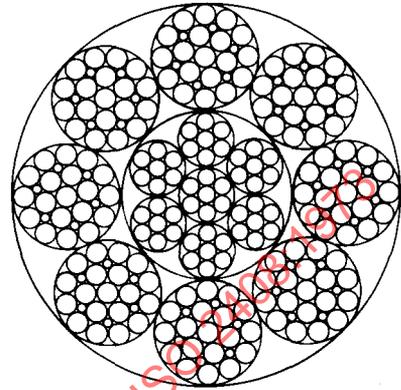
Surface finish of the wires : see 4.1.2.

6.13 Wire rope 8 X 19 Filler

Construction of the strand : 12 + 6F + 6 + 1



with fibre core (FC)



with steel core (WR)

TABLE 14

1 Nominal diameter	2 Tol.	3 Approximate mass		5 Minimum breaking load of the rope, corresponding to a tensile grade R_0 of the wires of			
		natural fibre cored ropes	steel cored ropes	6 1 570 N/mm ²		7 1 770 N/mm ²	
				fibre cored ropes	steel cored ropes	fibre cored ropes	steel cored ropes
d		M_{1n}	M_2	F_{01}	F_{02}	F_{01}	F_{02}
mm	%	kg/100 m	kg/100 m	kN	kN	kN	kN
8		22,8	27,8	29,5	34,8	33,3	39,2
9		28,9	35,2	37,3	44,1	42,1	49,7
10		35,7	43,5	46,1	54,4	52,0	61,3
11		43,1	52,6	55,8	65,8	62,9	74,2
12		51,3	62,6	66,4	78,3	74,8	88,3
13		60,2	73,5	77,9	91,9	87,8	104
14		69,9	85,2	90,3	107	102	120
16	+ 4	91,3	111	118	139	133	157
18	- 1	116	141	149	176	168	199
20		143	174	184	218	208	245
22		173	210	223	263	252	297
24		205	251	266	313	299	353
26		241	294	312	368	351	414
28		279	341	361	426	407	481
32		365	445	472	557	532	628
36		462	564	597	705	673	795

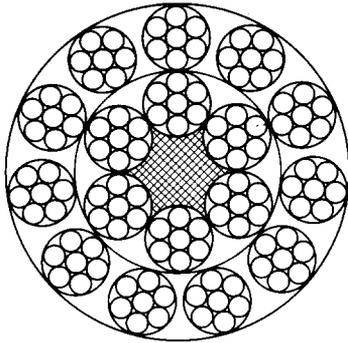
Surface finish of the wires : see 4.1.2.

6.14 Multi-strand ropes with two layers of round strands

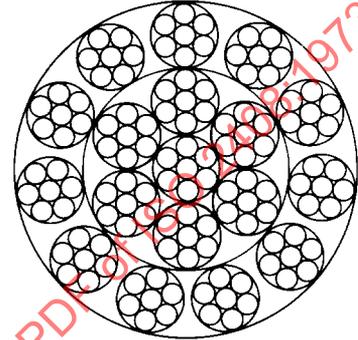
6.14.1 Wire rope 17 × 7 (Table 15)

Construction of the strand : 6 + 1

Construction of the rope : 11 + 6 + FC or WS



with fibre core (FC)

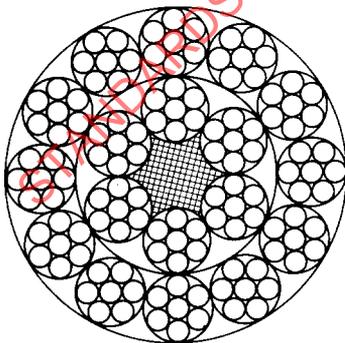


with steel core (WS)

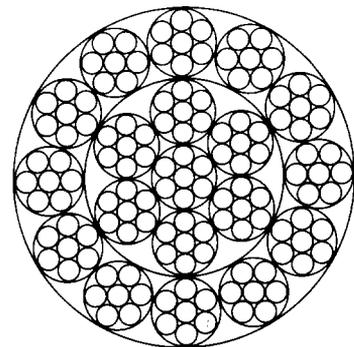
6.14.2 Wire rope 18 × 7 (Table 15)

Construction of the strand : 6 + 1

Construction of the rope : 12 + 6 + FC or WS



with fibre core (FC)



with steel core (WS)

TABLE 15

1	2	3	4	5	6	7	8
Nominal diameter		Approximate mass		Minimum breaking load of the rope, corresponding to a tensile grade R_0 of the wires of			
		natural fibre cored ropes	steel cored ropes	1 570 N/mm ²		1 770 N/mm ²	
d	Tol.	M_{1n}	M_2	F_{01}	F_{02}	F_{01}	F_{02}
mm	%	kg/100 m	kg/100 m	kN	kN	kN	kN
8		24,5	25,7	32,0	33,0	36,1	37,2
9		31,0	32,6	40,5	41,7	45,7	47,0
10		38,3	40,2	50,0	51,5	56,4	58,1
11		46,3	48,6	60,5	62,3	68,2	70,3
12		55,1	57,9	72,0	74,2	81,2	83,6
13		64,7	67,9	84,5	87,1	95,3	98,1
14	+ 4 - 1	75,0	78,8	98,0	101	111	114
16		98,0	103	128	132	144	149
18		124	130	162	167	183	188
20		153	161	200	206	226	232
22		185	195	242	249	273	281
24		220	231	288	297	325	335
26		259	272	338	348	381	393
28		300	315	392	404	442	455

Surface finish of the wires : see 4.1.2.