Doc: MED 10 (25706)
May 2024

BUREAU OF INDIAN STANDARDS

DRAFT FOR COMMENTS ONLY

भारतीय मानक **मसौदा**

सामान्य इंजीनिरिंग प्रयोजनों के लिए इस्पात तार रस्से — विशिष्टि

(आई एस 2266 का *छठवां पुनरीक्षण*)

Draft *Indian Standard*

STEEL WIRE ROPES FOR GENERAL ENGINEERING PURPOSE — SPECIFICATION

(*Sixth Revision* of IS 2266)

ICS 53.020.30; 77.140.65

Wire Ropes and Wire Products Sectional Committee, MED 10	Last date for receipt of comments is **19 June 2024**

FOREWORD

(*Formal clauses to be added later*)

This standard was first published in 1963 and subsequently revised in 1970, 1977, 1989, 2002 and 2019. The standard is being revised again for incorporating the modifications found necessary as a result of experience gained with the use of this standard. Also the major changes in the standard in this revision are given below:

a) The scope of the standard has been modified;
b) Provision for Rope size and Tolerance has been modified;
c) Requirements for minimum breaking force of wire has been modified in clause 5;
d) Wire construction, Core and Galvanization requirement has been modified in clause 7,8 and 10 respectively; and
e) Tables for rope construction have been modified;
f) Clause 13 Packing requirements has also been modified.

For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing the result of a test shall be rounded-off in accordance with IS 2: 2022 ‘Rules for rounding off numerical values (*second revision*)’. The number of significant places retained in the rounded-off value should be the same as that of the specified value in this standard

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Draft *Indian Standard*

STEEL WIRE ROPES FOR GENERAL ENGINEERING PURPOSE — SPECIFICATION

(*Sixth Revision*)

1 SCOPE

This standard covers general requirements for steel wire ropes used in cranes, excavators and other engineering applications. Most common rope constructions and rope types are given in following table. Common rope grades, cores and size ranges are identified by 'x' mark however, other sizes, intermediate grades (up to including 2160 grade) and core may be supplied as agreed between manufacturer and purchaser.

Specially developed constructions may be supplied to fulfil specific requirement of purchaser".

Class	Construction	Type	Rope Grade				Core		Size Range (Dia. In mm)	Ref. to Table
			1570	1770	1960	2160	Fibre	Steel		
4 x 19	4 x 19S (9-9-1)	Round	x	x	x	-	x	-	8 to 48	15
	4 x 25F (12-6F-6-1)		x	x	x	-	x	-	8 to 48	15
	4 x 26SW (10-5+5-5-1)		x	x	x	-	x	-	8 to 48	15
4 x 36	4 x 31SW (12-6+6-6-1)		x	x	x	-	x	-	8 to 48	15
	4 x 36SW (14-7+7-7-1)		x	x	x	-	x	-	8 to 48	15
	4 x 41SW (16-8+8-8-1)		x	x	x	-	x	-	8 to 48	15
6 x 7	6 × 7 (6-1)		x	x	x	-	x	x	2 to 12	1
6 x 19M	6 × 19 M (12/6-1)		x	x	x	-	x	x	3 to 52	2
6 x 37M	6 × 37 M (18/12/6-1)		x	x	x	-	x	x	6 to 64	3
6 x 19	6 × 17 S(8-8-1)		x	x	x	x	x	x	8 to 52	4
	6 × 19 S (9-9-1)		x	x	x	x	x	x	8 to 52	4
	6 × 21 F (10-5F-5-1)		x	x	x	x	x	x	8 to 64	5
	6 × 25 F (12-6F-6-1)		x	x	x	x	x	x	8 to 64	5
	6 x 29F (14-7F-7-1)		x	x	x	x	x	x	8 to 64	5
	6 × 26 SW (10-5+5-5-1)		x	x	x	x	x	x	8 to 52	6
6 x 36	6 × 31 SW (12-6+6-6-1)		x	x	x	x	x	x	8 to 52	6
	6 × 36 SW (14-7+7-7-1)		x	x	x	x	x	x	8 to 76	6
	6×41 SW (16-8+8-8-1)		x	x	x	x	x	x	32 to 92	6
	6 x 46SW (18-9+9-9-1)		x	x	x	x	x	x	45 to 92	6
	6 x 52SW (18-9+9-9/6-1)		x	x	x	x	x	x	45 to 92	6
	6×49 SWS (16-8+8-8-8-1)		x	x	x	x	x	x	45 to 92	6
	6×55 SWS (16-8+8-8-8/6-1)		x	x	x	x	x	x	52 to 92	6
	6x37SF (12-12-6F-6-1)		x	x	x	x	x	x	25 to 92	6
	6 x 41SF (16-8F-8-8-1)		x	x	x	x	x	x	25 to 92	6
	6 x 43SF (14-14-7F-7-1)		x	x	x	x	x	x	25 to 92	6
	6 x 49SF (16-16-8F-8-1)		x	x	x	x	x	x	25 to 92	6
	6 x 50SFS (14-14-7F-7-7-1)		x	x	x	x	x	x	25 to 92	6

	6 x 55SF (18-18-9F-9-1)		x	x	x	x	x	x	25 to 92	6
	6 x 57SFS (16-16-8F-8-8-1)		x	x	x	x	x	x	25 to 92	6
8 x 19	8 × 19 S(9-9-1)		x	x	x	x	x	x	8 to 52	7
	8 × 25 F (12-6F-6-1)		x	x	x	x	x	x	8 to 52	8
	8 x 26SW (10-5+5-1)		x	x	x	x	x	x	16 to 68	9
8 x 36	8 × 31 SW (12-6+6-6-1)		x	x	x	x	x	x	16 to 68	9
	8 × 36 SW (14-7+7-7-1)		x	x	x	x	x	x	16 to 68	9
	8 x 41SW (16-8+8-8-1)		x	x	x	x	x	x	28 to 68	9
	8 x 46 SW (18-9+9-9-1)		x	x	x	x	x	x	28 to 68	9
	8 x 52 SW (18-9+9-9/6-1)		x	x	x	x	x	x	28 to 68	9
	8 × 37 SF (12-12-6F-6-1)		x	x	x	x	x	x	16 to 68	9
	8 x 43SF (14-14-7F-7-1)		x	x	x	x	x	x	19 to 68	9
	8 x 49SF (16-16-8F-8-1)		x	x	x	x	x	x	28 to 68	9
	8 x 50SFS (14-14-7F-7-7-1)		x	x	x	x	x	x	28 to 68	9
	8 x 55SF (18-18-9F-9-1)		x	x	x	x	x	x	28 to 68	9
	8 x 57SFS (16-16-8F-8-8-1)		x	x	x	x	x	x	28 to 68	9
18 x 7	17 × 7 [11 × 7(6-1): 6 × 7(6-1)]		x	x	x	x	x	x	6 to 40	10
	18 × 7[12 × 7(6-1): 6 x7(6-1)]		x	x	x	x	x	x	6 to 40	10
34(M) x 7	34 × 7[17 × 7(6-1): 11 × 7(6-1)/6 × 7(6-1)]		x	x	x	x	x	x	12 to 56	11
	36 × 7[18 × 7(6-1): 12 × 7(6-1)/6 × 7(6-1)]		x	x	x	x	x	x	12 to 56	11
15 x 7	15 x 7 (6-1)		x	x	x	x	-	x	8 to 20	14
	16 x 7 (6-1)		x	x	x	x	-	x	8 to 20	14
35(W) x 7	28 x 7 [16 (6-1) : 4 (6-1) + 4 (6-1) – 4 (6-1)]		x	x	x	x	-		8 to 20	14
	29 x 7 [16 (6-1) : 6F (6-1) – 6 (6-1) – 1 (6-1)]		x	x	x	x	-	x	8 to 60	14
	35 x 7 [16 (6-1) :6 (6-1) + 6 (6-1) – 6 (6-1) – 1 (6-1)]		x	x	x	x	-	x	8 to 60	14
	40 x 7 [18 (6-1) : 7 (6-1) + 7 (6-1) – 7 (6-1)- 1 (6-1)]		x	x	x	x	-	x	8 to 60	14
35(W) x 19	35 x 19S [16 (9-9-1) : 6 (9-9-1) + 6 (9-9-1) – 6 (9-9-1) – 1 (9-9-1)]		x	x	x	x	-	x	40 to 60	14
	12 × 6 (6-0): 3 × 24 (15/9-Fibre)	Oval	x	x	x	-	x	x	8 to 40	12
	6 × V25 (12/12-Δ)	Flattened strand	x	x	x	-	x	x	12 to 48	13

2 REFERENCES

The standards listed below contain provisions, which through reference in this text constitute provisions of this standard. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this standard are encouraged to investigate the possibility of applying the most recent edition of the standards indicated below:

IS No.	*Title*
IS 6594 : 2018	Technical supply conditions for steel wire ropes and strands (*third revision*)
IS 1804 : 2004	Steel wire ropes — Fibre main cores (*fourth revision*)
IS 1835 : 1976	Round steel wires for ropes (*third revision*)
IS 2363 : 1981	Glossary of terms relating to wire rope (*fist revision)*

3 TERMINOLOGY

For the purpose of this standard the terms given in IS 2363 shall apply.

4 ROPE SIZE AND TOLERANCE

Purchaser shall specify the size of the rope designated as 'Nominal Diameter'. The most common rope sizes are given in Table 1 to 15, however other sizes may be supplied as agreed between manufacturer and purchaser. The actual diameter of the rope as supplied shall be within following percent of the nominal diameter.

Nominal Diameter of rope 'd' mm	Tolerance as percentage of Nominal Diameter
$2 \leq d < 4$	-0, +8
$4 \leq d < 6$	-0, +7
$6 \leq d < 8$	-0, +6
$d \geq 8$	-0, +5

5 MINIMUM BREAKING FORCE

The values of Minimum Breaking Force

a) Shall not be less than as specified in Table 1 to Table 15, given for more common construction and sizes and grades. For intermediate rope diameters, the values shall not be less than those obtained using formula in *clause* **6.6** of IS 6594 standard.
   Or
b) As agreed between manufacture and purchaser (for the constructions not covered in Table 1 to Table 13 and other specially developed wire ropes e.g. Competed Ropes, Cushion Core Ropes. Plastic Valley Filled Wire Ropes, Swaged Ropes, Swaged Rope, and Combination Ropes etc.)

Note – Rope grade shall be 1570, 1770, 1960, 2160 or intermediate grades as agreed between manufacturer and purchaser.

6 GENERAL REQUIREMENT

The wire rope shall conform to IS 6594 and shall meet the following requirements.

7 CONSTRUCTION

The rope construction may be chosen from 1. However, considering wide range of engineering application other varieties of construction may be developed, manufactured and supplied with the consent of users.

Special developed ropes like compacted ropes, cushion core ropes, plastic valley filled ropes, Swaged Ropes, Combination Rope, Parallel Closed etc. may also be supplied to fulfil special requirement of the customer as agreed between manufacture and supplier.

8 CORE

Cores of single layer stranded rope shall normally be of steel or fibre, although other types such as composites (e.g. steel plus fibre or steel plus polymers) or solid polymer may also be supplied if agreed between manufacturer and purchaser.

8.1 Fibre Core

Fibre core shall be as per IS 1804.

8.2 Steel Core

Steel core shall be as per IS 6594.

Note — Other type cores such as composite core, cushion core or solid polymer cores shall be as agreed between manufacturer and supplier.

9 JOINTS

Tucked joints in wires during rope making are permitted for wires of 0.5 mm diameter and smaller.

10 GALVANIZING

When galvanizing is required it shall conform to any of the Type (A, AB or B) of IS 1835 as may be specified by the purchaser. Zn Al alloy coating may also be supplied for improved corrosion resistance as agreed between manufacturer and purchaser.

11 SAMPLING PLAN

11.1 Lot

Steel wire ropes of same size manufactured using the same set of strands and same type of core under identical condition of production shall constitute a lot.

NOTE — Manufacturer shall provide evidence of the tractability of the individual rope lengths to the parent rope to establish that those represent the lot as defied above.

11.2 For ascertaining the conformity of a lot. The following sampling plan shall be made:

a) Dimensional checking — 100 percent; and
b) Breaking force test — One sample from a lot.

12 MARKING

12.1 The size, construction, rope grade, lay, core coating and length of wire rope, reel/coil number along with the order number of purchaser and any other marking which may be specified by the purchaser shall be legibly mentioned on a suitable tag securely attached when wire ropes are supplied in coils. In case wire ropes are supplied in reels, the information may be stenciled on both sides of the reels or stenciled on one side of the reel and a suitable tag giving the same information may be attached on the other side of the reel.

12.2 BIS Certification Marking

The product may also be marked with Standard Mark.

12.2.1 The product(s) conforming to the requirements of this standard may be certified as per the conformity assessment schemes under the provisions of the *Bureau of Indian Standards Act*, 2016 and the Rules and Regulations framed thereunder, and the products may be marked with the standard mark.

13 PACKING

The ropes shall be protected suitably to avoid damage in transit and corrosion.

Table 1 Mass and Breaking Force for 6 X 7(6-1) Construction Ropes
(*Clause* 1, 4 and 5)

Table-1A

Nominal Diameter	**Approximate Mass**		**Minimum Braking Force Corresponding to Rope Grade of**					
			1570		1770		1960	
	Fibre Core	Steel Core	Fibre Core	Steel Core	Fibre Core	Steel Core	Fibre Core	Steel Core
	(CF)	(CWR)	(CF)	(CWR)	(CF)	(CWR)	(CF)	(CWR)
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
mm	kg/100 m	kg/100 m	kN	kN	kN	kN	kN	kN
2	1.43	1.57	2.1	2.3	2.4	2.5	2.6	2.8
3	3.22	3.54	4.7	5.1	5.3	5.7	5.9	6.3
4	5.72	6.29	8.3	9.0	9.4	10.2	10.4	11.3
5	8.94	9.83	13.0	14.1	14.7	15.9	16.3	17.6
6	12.9	14.2	18.8	20.3	21	23	23	25
7	17.5	19.3	25.6	27.6	29	31	32	34
8	22.9	25.2	33	36	38	41	42	45
9	28.9	31.8	42	46	48	51	53	57
10	35.7	39.3	52	56	59	64	65	70
11	43.2	47.6	63	68	71	77	79	85
12	51.5	56.6	75	81	85	91	94	101
NOTE — To calculate the aggregate breaking force multiply the figures given in 4, 6 and 8 by 1.111 and in 5, 7 and 9 by 1.193. Wire strand core (CWS) may be used for rope diameter 12 mm and below.								

Table-1B (Compacted Ropes)

Nominal Diameter	Approximate Mass		Minimum Braking Force Corresponding to Rope Grade of					
			1570		1770		1960	
	Fibre Core (CF)	Steel Core (CWR)	Fibre Core (CF)	Steel Core (CWR)	Fibre Core (CF)	Steel Core (CWR)	Fibre Core (CF)	Steel Core (CWR)
mm	kg/100 m	kg/100 m	kN	kN	kN	kN	kN	kN
2	1.64	-	2.36	-	2.66	-	2.94	-
3	3.69	-	5.3	-	5.97	-	6.62	-
4	6.56	-	9.42	-	10.6	-	11.8	-
5	10.3	-	14.7	-	16.6	-	18.4	-
6	14.8	-	21.2	-	23.9	-	26.5	-
7	20.1	-	28.8	-	32.5	-	36	-
8	26.2	-	37.7	-	42.5	-	47	-
9	33.2	-	47.7	-	53.8	-	59.5	-
10	41	-	58.9	-	66.4	-	73.5	-
11	49.6	-	71.2	-	80.3	-	88.9	-
12	59	-	84.8	-	95.6	-	106	-

Table 2 Mass and Breaking Force for 6 X 19 M(12/6-1) Construction Ropes
(*Clause* 1, 4 and 5)

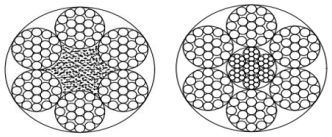
Typical Cross Section	Typical Construction	
	Rope Construction	Strand Construction
 WITH FIBRE CORE (CF) WITH STEEL CORE (CWR)	6x19M	12/6-1

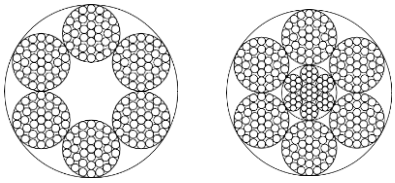
Table-2A

Nominal Diameter	Approximate Mass		Minimum Braking Force Corresponding to Rope Grade of					
			1570		1770		1960	
	Fibre Core (CF)	Steel Core (CWR)	Fibre Core (CF)	Steel Core (CWR)	Fibre Core (CF)	Steel Core (CWR)	Fibre Core (CF)	Steel Core (CWR)
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
mm	kg/100 m	kg/100 m	kN	kN	kN	kN	kN	kN
3	3.11	3.43	4.3	4.7	4.9	5.3	5.4	5.9
4	5.54	6.09	7.7	8.3	8.7	9.4	9.6	10.4
5	8.65	9.52	12.1	13	13.6	14.7	15.1	16.3
6	12.5	13.7	17.4	18.8	19.6	21	22	23
7	17	18.6	23.6	25.5	27	29	30	32
8	22.1	24.4	31	33	35	38	39	42
9	28	30.8	39	42	44	48	49	53
10	34.6	38.1	48	52	54	59	60	65
11	41.9	46.1	58	63	66	71	73	79
12	49.8	54.8	69	75	78	85	87	94
13	58.5	64.3	82	88	92	99	102	110
14	67.8	74.6	95	102	107	115	118	128
16	88.6	97.4	124	133	139	150	154	167

18	112	123	156	169	176	190	195	211
19	125	137	174	188	196	212	217	235
20	138	152	193	208	218	235	241	260
22	167	184	234	252	263	284	292	315
24	199	219	278	300	313	338	347	375
25	216	238	302	326	340	367	376	407
26	234	257	326	352	368	397	407	440
28	271	298	378	409	426	461	472	510
32	354	390	494	534	557	602	617	666
36	448	493	625	675	705	761	781	843
38	500	550	697	752	785	848	870	939
40	554	609	772	834	870	940	964	1041
44	670	737	934	1 009	1 053	1 137	1 166	1 259
48	797	877	1 112	1 201	1 253	1 354	1 388	1 499
52	936	1 029	1 305	1 409	1 471	1 588	1 629	1 759

NOTE — To calculate the aggregate breaking force multiply the figures given in col. 4, 6 and 8 by 1.212 and in col. 5, 7 and 9 by 1.302 Wire strand core (CWS) may be used for rope diameter 12 mm and below.

Table 3 Mass and Breaking Force for 6 X 37 M (18/12/6-1) Construction Ropes
(*Clause* 1, 4 and 5)

Typical Cross Section	**Typical Construction**	
	Rope Construction	**Strand Construction**
 WITH FIBRE CORE (CF) WITH STEEL CORE (CWR)	6 x 37M	18/12/6-1

Nominal Diameter	**Approximate Mass**		**Minimum Breaking Force Corresponding to Rope Grade of**					
			1570		1770		1960	
	Fibre Core	Steel Core	Fibre Core	Steel Core	Fibre Core	Steel Core	Fibre Core	Steel Core
	(CF)	(CWR)	(CF)	(CWR)	(CF)	(CWR)	(CF)	(CWR)
1	2	3	4	5	6	7	8	9
mm	kg/100m	kg/100m	kN	kN	kN	kN	kN	kN
6	12.5	13.7	16.7	18	18.8	20	21	22
7	17	18.6	22.5	24.5	26	28	28	31
8	22.1	24.4	30	32	33	36	37	40
9	28	30.8	37	40	42	46	47	51
10	34.6	38.1	46	50	52	56	58	62
11	41.9	46.1	56	60	63	68	70	76
12	49.8	54.8	67	72	75	81	83	90
13	58.5	64.3	78	84	88	95	98	105
14	67.8	74.6	91	98	102	110	113	122
16	88.6	97.4	118	128	134	144	148	160
18	112	123	150	162	169	183	187	202
19	125	137	167	180	188	203	209	225

20	138	152	185	200	209	225	231	250
22	167	184	224	242	253	273	280	302
24	199	219	267	288	301	325	333	359
25	216	238	289	312	326	352	361	390
26	234	257	313	338	353	381	391	422
28	271	298	363	392	409	442	453	489
32	354	390	474	512	534	577	592	639
36	448	493	600	648	676	730	749	809
38	500	550	668	722	753	814	834	901
40	554	609	741	800	835	902	924	999
44	670	737	896	968	1010	1 091	1 119	1 208
48	797	877	1 066	1 152	1 202	1 298	1 331	1 438
52	936	1 029	1 252	1 352	1 411	1 524	1 562	1 687
56	1 085	1194	1 451	1 568	1 636	1 767	1 812	1 957
60	1 246	1 370	1 666	1 800	1 878	2 029	2 080	2 247
64	1 417	1 559	1 896	2 048	2 137	2 308	2 367	2 556

NOTE — To calculate the aggregate breaking force multiply the figures given in col. 4, 6 and 8 by 1.212 and in col. 5, 7 and 9 by 1.302 Wire strand core (CWS) may be used for rope diameter 12 mm and below.

Table 4 Mass and Breaking Force for 6 x 19 Class Seale Construction Ropes

(*Clause* 1, 4 and 5)

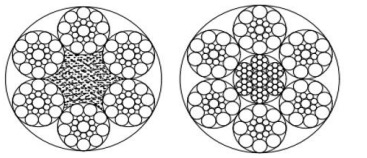
Typical Cross Section	Typical Construction	
	Rope Construction	**Strand Construction**
 WITH FIBRE CORE (CF) WITH STEEL CORE (CWR)	6 x 17S	8-8-1
	6 x 19S	9-9-1

Table-4A

Nominal Diameter	Approximate Mass		Minimum Braking Force Corresponding to Rope Grade of							
			1570		1770		1960		2160	
	Fibre Core	Steel Core	Fibre Core	Steel Core	Fibre Core	Steel Core	Fibre Core	Steel Core	Fibre Core	Steel Core
	(CF)	(CWR)	(CF)	(CWR)	(CF)	(CWR)	(CF)	(CWR)	(CF)	(CWR)
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
mm	kg/100 m	kg/100 m	kN	kN	kN	kN	kN	kN	kN	kN
8	23.8	26.2	33	36	37	40	42	45	46	49
9	30.2	33.2	42	45	47	51	53	57	58	63
10	37.3	41	52	56	59	63	65	70	71	77
11	45.1	49.6	63	68	71	77	78	85	87	93
12	53.7	59	75	81	84	91	93	101	103	111
13	63	69.3	88	95	99	107	110	118	121	130
14	73	80.3	102	110	115	124	127	137	140	151
16	95.4	105	133	144	150	162	166	179	183	198
18	121	133	168	182	190	205	210	227	232	250
19	135	148	188	203	211	228	234	253	258	279
20	149	164	208	224	234	253	260	280	286	309
22	180	198	252	272	284	306	314	339	346	374
24	215	236	299	323	337	364	374	403	412	445

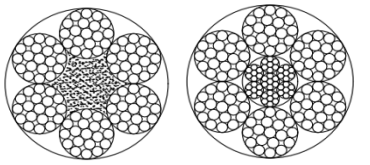
25	233	256	325	351	366	395	405	438	447	482
26	252	277	351	379	396	428	439	474	483	522
28	292	321	407	440	459	496	509	549	561	605
32	382	420	532	575	600	648	664	717	732	791
36	483	531	673	727	759	820	841	908	927	1 000
38	538	592	750	810	846	913	937	1 012	1 032	1 115
40	596	656	831	898	937	1012	1 038	1 121	1 144	1 235
44	721	794	1 006	1 086	1 134	1 225	1 256	1 356	1 384	1 495
48	858	944	1 197	1 293	1 350	1 458	1 495	1 614	1 647	1 779
52	1 008	1 108	1 405	1 517	1 584	1 711	1 754	1 894	1 933	2 087

NOTE — To calculate the aggregate breaking force multiply the figures given in col. 4, 6, 8 and 10 by 1.163 and in col. 5, 7, 9 and 11 by 1.25. Wire strand core (CWS) may be used for rope diameter 12 mm and below.

Table – 4B (Compacted Ropes)

Nominal Diameter	**Approximate Mass**		**Minimum Braking Force Corresponding to Rope Grade of**					
			1570		1770		1960	
	Fibre Core	Steel Core	Fibre Core	Steel Core	Fibre Core	Steel Core	Fibre Core	Steel Core
	(CF)	(CWR)	(CF)	(CWR)	(CF)	(CWR)	(CF)	(CWR)
mm	kg/100 m	kg/100 m	kN	kN	kN	kN	kN	kN
8	27.2	30.5	37.5	41.2	42.3	46.4	46.8	51.4
9	34.4	38.6	47.4	52.1	53.5	58.8	59.2	65.1
10	42.5	47.7	58.6	64.4	66	72.6	73.1	80.4
11	51.4	57.7	70.9	77.9	79.9	87.8	88.5	97.2
12	61.2	68.7	84	93	95	105	105	116
13	71.8	80.6	99	109	112	123	124	136
14	83.3	93.5	115	126	129	142	143	158
16	109	122	150	165	169	186	187	206
18	138	155	190	209	214	235	237	260
19	153	172	211	232	238	262	264	290
20	170	191	234	257	264	290	292	321
22	206	231	283	312	320	351	354	389
24	245	275	337	371	380	418	421	463
25	266	298	366	402	413	454	457	502
26	287	322	396	435	446	491	494	543
28	333	374	459	505	518	569	573	630
32	435	488	600	659	676	743	749	823
36	551	618	759	834	856	941	947	1 041
38	614	689	846	930	953	1 048	1 056	1 160
40	680	763	937	1 030	1 056	1 161	1 170	1 286
44	823	923	1134	1 246	1 278	1 405	1 415	1 556
48	979	1 099	1 349	1 483	1 521	1 672	1 684	1 851
52	1 149	1 290	1583	1 741	1 785	1 962	1 977	2 173

Table 5 Mass and Breaking Force for 6 X 19 Class Filler Construction Ropes
(*Clause* 1, 4 and 5)

Typical Cross Section	Typical Construction	
 WITH FIBRE CORE (CF) WITH STEEL CORE (CWR)	**Rope Construction**	**Strand Construction**
	6 x 21F	10-5F-5-1
	6 x 25F	12-6F-6-1
	6 x 29F	14-7F-7-1

Nominal Diameter	**Approximate Mass**		**Minimum Braking Force Corresponding to Rope Grade of**							
			1570		1770		1960		2160	
	Fibre Core	Steel Core	Fibre Core	Steel Core	Fibre Core	Steel Core	Fibre Core	Steel Core	Fibre Core	Steel Core
	(CF)	(CWR)	(CF)	(CWR)	(CF)	(CWR)	(CF)	(CWR)	(CF)	(CWR)
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
mm	kg/100 m	kg/100 m	kN	kN	kN	kN	kN	kN	kN	kN
8	24.3	26.8	34	37	38	41	42	46	47	50
9	30.8	33.9	43	46	48	52	54	58	59	64
10	38	41.8	53	57	60	65	66	71	73	79
11	46	50.6	64	69	72	78	80	86	88	95
12	54.7	60.2	76	82	86	93	95	103	105	113
13	64.3	70.7	90	97	101	109	112	121	123	133
14	74.5	82	104	112	117	127	130	140	143	154
16	97.3	107	136	147	153	165	169	183	187	202
18	123	135	172	186	194	209	214	232	236	255
19	137	151	191	207	216	233	239	258	263	284
20	152	167	212	229	239	258	265	286	292	315
22	184	202	257	277	289	312	320	346	353	381
24	219	241	305	330	344	372	381	412	420	454
25	238	261	331	358	374	403	414	447	456	492
26	257	283	358	387	404	436	447	483	493	533
28	298	328	416	449	469	506	519	560	572	618
32	389	428	543	586	612	661	678	732	747	807
36	493	542	687	742	775	837	858	926	945	1021
38	549	604	766	827	863	932	956	1032	1053	1138
40	608	669	848	916	956	1033	1059	1144	1167	1260
44	736	810	1026	1109	1157	1250	1281	1384	1412	1525
48	876	964	1222	1319	1377	1487	1525	1647	1681	1815
52	1028	1131	1434	1548	1616	1745	1790	1933	1972	2130
56	1192	1311	1663	1796	1874	2024	2076	2242	2287	2470
60	1369	1506	1909	2061	2152	2324	2383	2573	2626	2836
64	1557	1713	2172	2345	2448	2644	2711	2928	-	-

NOTE — To calculate the aggregate breaking force multiply the figures given in col. 4, 6, 8 and 10 by 1.163 and in col. 5, 7, 9 and 11 by 1.25. Wire strand core (CWS) may be used for rope diameter 12 mm and below.

Table 6 Mass and Breaking Force for 6 x 36 Class and 6 X 26 SW Construction Ropes

(*Clause* 1, 4 and 5)

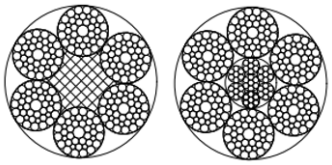
Typical Cross Section	Typical Construction	
 WITH FIBRE CORE (CF) WITH STEEL CORE (CWR)	**Rope Construction**	**Strand Construction**
	6 x 26SW	10-5+5-5-1
	6 × 31 SW	12-6 + 6-6-1
	6 × 36 SW	14-7 + 7-7-1
	6 × 41 SW	16-8 + 8-8-1
	6 x 46SW	18-9+9-9-1
	6 x 52SW	18-9+9-9/6-1
	6 × 49 SWS	16-8 + 8-8-8-1
	6 × 55 SWS	16-8 + 8-8-8/6-1
	6 x 37SF	12-12-6F-6-1
	6 x 41SF	16-8F-8-8-1
	6 x 43SF	14-14-7F-7-1
	6 x 49SF	16-16-8F-8-1
	6 x 50SFS	14-14-7F-7-7-1
	6 x 55SF	18-18-9F-9-1
	6 x 57SFS	16-16-8F-8-8-1

Table-6A

Nominal Diameter	Approximate Mass		Minimum Braking Force Corresponding to Rope Grade of							
			1570		1770		1960		2160	
	Fibre Core (CF)	Steel Core (CWR)	Fibre Core (CF)	Steel Core (CWR)	Fibre Core (CF)	Steel Core (CWR)	Fibre Core (CF)	Steel Core (CWR)	Fibre Core (CF)	Steel Core (CWR)
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
mm	kg/100 m	kg/100 m	kN	kN	kN	kN	kN	kN	kN	kN
8	24.3	26.8	33	36	37	40	41	45	46	49
9	30.8	33.9	42	45	47	51	52	57	58	62
10	38	41.8	52	56	58	63	65	70	71	77
11	46	50.6	63	68	71	76	78	85	86	93
12	54.7	60.2	75	81	84	91	93	101	103	111
13	64.3	70.7	88	95	99	107	109	118	120	130
14	74.5	82	102	110	114	124	127	137	140	151
16	97.3	107	133	143	149	161	166	179	182	197
18	123	135	168	181	189	204	209	226	231	249
19	137	151	187	202	211	228	233	252	257	278
20	152	167	207	224	234	252	259	279	285	308
22	184	202	251	271	283	305	313	338	345	372
24	219	241	298	322	336	363	372	402	410	443
25	238	261	324	350	365	394	404	436	445	481
26	257	283	350	378	395	426	437	472	482	520
28	298	328	406	439	458	494	507	548	559	603
32	389	428	530	573	598	646	662	715	730	788
36	493	542	671	725	757	817	838	905	924	997
38	549	604	748	808	843	911	934	1008	1 029	1 111
40	608	669	829	895	934	1 099	1 035	1 117	1 140	1 231
44	736	810	1 003	1 083	1 130	1 221	1 252	1 352	1 380	1 490

48	876	964	1 193	1 289	1 345	1 453	1 490	1 609	1 642	1 773
52	1 028	1 131	1 401	1 513	1 579	1 705	1 748	1 888	1 927	2 081
56	1 192	1 311	1 624	1 754	1 831	1 978	2 028	2 190	2 235	2 413
60	1 369	1 506	1 865	2 014	2 102	2 270	2 328	2 514	2 565	2 771
64	1 557	1 713	2 121	2 291	2 392	2 583	2 648	2 860	-	-
68	1 758	1 934	2 395	2 587	2 700	2 916	2 990	3 229	-	-
70	1 863	2 049	2 538	2 741	2 861	3 090	3 168	3 422	-	-
72	1 971	2168	2 685	2 900	3 027	3 269	3 352	3 620	-	-
76	2 196	2 416	2 992	3 231	3 373	3 643	3 435	4 034	-	-
80	2 433	2 676	3 315	3 580	3 737	4 036	4 138	4 469	-	-
84	2 683	2 951	3655	3 947	4 120	4 450	4 562	4 928	-	-
86	2 812	3 093	3 831	4 137	4 319	4 664	4 782	5 165	-	-
88	2 944	3 239	4 011	4 332	4 522	4 884	5 007	5 408	-	-
92	3 218	3 540	4 384	4 735	4 942	5 338	5 473	5 911	-	-
NOTE — To calculate the aggregate breaking force multiply the figures given in col. 4, 6, 8 and 10 by 1.19 and in col. 5, 7, 9 and 11 by 1.28. Wire strand core (CWS) may be used for rope diameter 12 mm and below.										

Table-6B (Compacted Ropes)

Nominal Diameter	**Approximate Mass**		**Minimum Braking Force Corresponding to Rope Grade of**			
			1770		1960	
	Fibre Core	Steel Core	Fibre Core	Steel Core	Fibre Core	Steel Core
	(CF)	(CWR)	(CF)	(CWR)	(CF)	(CWR)
(1)	(2)	(3)	(4)	(5)	(6)	(7)
mm	kg/100 m	kg/100 m	kN	kN	kN	kN
8	27.2	30.5	42.3	46.4	46.8	51.4
9	34.4	38.6	53.5	58.8	59.2	65.1
10	42.5	47.7	66	72.6	73.1	80.4
11	51.4	57.7	79.9	87.8	88.5	97.2
12	61.2	68.7	95	105	105	116
13	71.8	80.6	112	123	124	136
14	83.3	93.5	129	142	143	158
16	109	122	169	186	187	206
18	138	155	214	235	237	260
19	153	172	238	262	264	290
20	170	191	264	290	292	321
22	206	231	320	351	354	389
24	245	275	380	418	421	463
25	266	298	413	454	457	502
26	287	322	446	491	494	543
28	333	374	518	569	573	630
32	435	488	676	743	749	823
36	551	618	856	941	947	1 041
38	614	689	953	1 048	1 056	1 160
40	680	763	1 056	1 161	1 170	1 286
44	823	923	1 278	1 405	1 415	1 556
48	979	1 099	1 521	1 672	1 684	1 851
52	1 149	1 290	1 785	1 962	1 977	2 173
56	1 333	1 496	2 070	2 276	2 293	2 520
60	1 530	1 717	2 377	2 613	2 632	2 893

Table 7 Mass and Breaking Force for 8 x 19 S (9-9-1) Construction of 8 x 19 Class Ropes
(*Clauses* 1, 4 *and* 5)

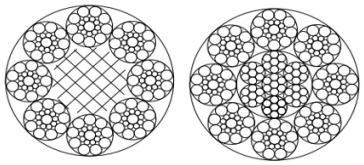
Typical Cross Section	Typical Construction	
	Rope Construction	**Strand Construction**
 WITH FIBRE CORE (CF) WITH STEEL CORE (CWR)	8 x 19S	9-9-1

Table-7A

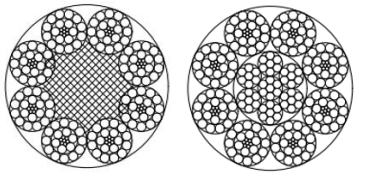
Nominal Diameter	**Approximate Mass**		**Minimum Braking Force Corresponding to Rope Grade of**							
			1570		1770		1960		2160	
	Fibre Core	Steel Core	Fibre Core	Steel Core	Fibre Core	Steel Core	Fibre Core	Steel Core	Fibre Core	Steel Core
	(CF)	(CWR)	(CF)	(CWR)	(CF)	(CWR)	(CF)	(CWR)	(CF)	(CWR)
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
mm	kg/100 m	kg/100 m	kN	kN	kN	kN	kN	kN	kN	kN
8	22.3	27.2	29	34	33	38	36	42	40	47
9	28.2	34.4	36	43	41	49	46	54	50	59
10	34.9	42.5	45	53	51	60	56	66	62	73
11	42.2	51.4	55	64	61	73	68	80	75	88
12	50.2	61.2	65	77	73	86	81	96	89	105
13	58.9	71.8	76	90	86	101	95	112	105	124
14	68.3	83.3	88	104	100	117	110	130	122	143
16	89.2	109	115	136	130	153	144	170	159	187
18	113	138	146	172	165	194	182	215	201	237
19	126	153	163	192	183	216	203	240	224	264
20	139	170	180	213	203	240	225	265	248	293
22	169	206	218	257	246	290	272	321	300	354
24	201	245	260	306	293	345	324	382	357	421
25	218	266	282	332	317	375	352	415	387	457
26	236	287	305	359	343	405	380	449	419	494
28	273	333	353	417	398	470	441	520	486	573
32	357	435	461	544	520	614	576	680	635	749
36	452	551	584	689	658	777	729	860	803	948
38	503	614	651	768	734	865	812	958	895	1 056
40	558	680	721	851	813	959	900	1 062	992	1 170
44	675	823	872	1029	983	1 160	1 089	1 285	1 200	1 416
48	803	979	1 038	1 225	1 170	1 381	1 296	1 529	1 428	1 685
52	942	1 149	1 218	1 437	1 374	1 621	1 521	1 795	1 676	1 978

NOTE — To calculate the aggregate breaking force multiply the figures given in col. 4.6, 8 and 10 by 1.19 and in col. 5, 7, 9 and 11 by 1.332. Wire strand core (CWS) may be used for rope diameter 12 mm and below.

Table – 7B (Compacted Ropes)

Nominal Diameter	**Approximate Mass**		**Minimum Breaking Force Corresponding to Rope Grade of**			
			1770		1960	
	Fibre Core	Steel Core	Fibre Core	Steel Core	Fibre Core	Steel Core
	(CF)	(CWR)	(CF)	(CWR)	(CF)	(CWR)
(1)	(2)	(3)	(4)	(5)	(6)	(7)
mm	kg/100 m	kg/100 m	kN	kN	kN	kN
8	25.9	31.7	37.4	46.4	41.4	51.4
9	32.8	40.1	47.3	58.8	52.4	65.1
10	40.5	49.5	58.4	72.6	64.7	80.4
11	49	59.9	70.7	87.8	78.3	97.2
12	58.3	71.3	84.1	105	93.1	116
13	68.4	83.7	98.7	123	109	136
14	79.4	97.0	114	142	127	158
16	104	127	150	186	166	206
18	131	160	189	235	210	260
19	146	179	211	262	233	290
20	162	198	234	290	259	321
22	196	240	283	351	313	389
24	233	285	336	418	373	463
25	253	309	365	454	404	502
26	274	335	395	491	437	543
28	318	388	458	569	507	630
32	415	507	598	743	662	823
36	525	642	757	941	838	1 041
38	585	715	843	1 048	934	1 160
40	648	792	935	1 161	1 035	1 286
44	784	958	1 131	1 405	1 252	1 556
48	933	1 140	1 346	1 672	1 490	1 851
52	1 095	1 338	1 579	1 962	1 749	2 173

Table 8 Mass and Breaking Force for 8 x 25 F (12-6 F- 6-1) Construction of 8 x 19 Class Ropes
(*Clause* 1, 4 and 5)

Typical Cross Section	Typical Construction	
	Rope Construction	**Strand Construction**
 WITH FIBRE CORE (CF) WITH STEEL CORE (CWR)	8 x 25F	12-6F-6-1

Nominal Diameter	**Approximate Mass**		**Minimum Breaking Force Corresponding to Rope Grade of**							
			1570		1770		1960		2160	
	Fibre Core	Steel Core	Fibre Core	Steel Core	Fibre Core	Fibre Core	Fibre Core	Steel Core	Fibre Core	Steel Core
	(CF)	(CWR)	(CF)	(CWR)	(CF)	(CF)	(CF)	(CWR)	(CF)	(CWR)
(1)	(2)	(3)	(4)	(5)	(6)	(8)	(8)	(9)	(10)	(11)
mm	kg/100 m	kg/100 m	kN	kN	kN	kN	kN	kN	kN	kN
8	22.8	27.8	30	35	33	39	37	43	41	48
9	28.9	35.2	37	44	42	50	47	55	51	61
10	35.7	43.5	46	54	52	61	58	68	63	75
11	43.1	52.6	56	66	63	74	70	82	77	91
12	51.3	62.6	66	78	75	88	83	98	91	108
13	60.2	73.5	78	92	88	104	97	115	107	126
14	69.9	85.2	90	107	102	120	113	133	124	147
16	91.3	111	118	139	133	157	147	174	162	192
18	116	141	149	176	168	199	186	220	205	242
19	129	157	166	196	188	221	208	245	229	270
20	143	174	184	218	208	245	230	272	254	299
22	173	210	223	263	252	297	279	329	307	362
24	205	251	266	313	299	353	331	391	365	431
25	223	272	288	340	325	383	360	424	396	468
26	241	294	312	368	351	414	389	459	429	506
28	279	341	361	426	407	481	451	532	497	587
32	365	445	472	557	532	628	589	695	649	766
36	462	564	597	705	673	795	746	880	822	970
38	515	628	666	785	750	885	831	980	916	1 080
40	570	696	738	870	831	981	921	1 086	1 015	1 197
44	690	842	892	1 053	1 006	1 187	1 114	1 314	1 228	1 449
48	821	1 002	1 062	1 253	1 197	1 413	1 326	1 564	1 461	1 724
52	964	1 176	1 246	1 471	1 405	1 658	1 556	1 836	1 715	2 023

NOTE — To calculate the aggregate breaking force multiply the figures given in col. 4, 6, 8 and 10 by 1.19 and in col. 5, 7, 9 and 11 by 1.332. Wire strand core (CWS) may be used for rope diameter 12 mm and below.

Table 9 Mass and Breaking Force for 8 x 36 Class and 8 x 26SW Construction Ropes

(*Clause* 1, 4 and 5)

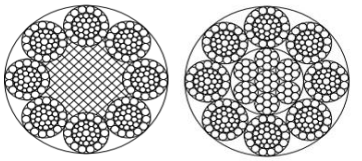
Typical Cross Section	Typical Construction	
 WITH FIBRE CORE (CF) WITH STEEL CORE (CWR)	**Rope Construction**	**Strand Construction**
	8 x 26SW	10-5+5-5-1
	8 × 31 SW	12-6 + 6-6-1
	8 × 36 SW	14-7 + 7-7-1
	8 × 41 SW	16-8 + 8-8-1
	8 x 46 SW	18-9+9-9-1
	8 x 52 SW	18-9+9-9/6-1
	8 × 49 SWS	16-8 + 8-8-8-1
	8×55 SWS	16-8 + 8-8-8/6-1
	8 x 37SF	12-12-6F-6-1
	8 x 43SF	14-14-7F-7-1
	8 x 49SF	16-16-8F-8-1
	8 x 50SFS	14-14-7F-7-7-1
	8 x 55SF	18-18-9F-9-1
	8 x 57SFS	16-16-8F-8-8-1

Table – 9A

Nominal Diameter	**Approximate Mass**		**Minimum Braking Force Corresponding to Rope Grade of**							
			1570		1770		1960		2160	
	Fibre Core	Steel Core	Fibre Core	Steel Core	Fibre Core	Steel Core	Fibre Core	Steel Core	Fibre Core	Steel Core
	(CF)	(CWR)	(CF)	(CWR)	(CF)	(CWR)	(CF)	(CWR)	(CF)	(CWR)
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
mm	kg/100 m	kg/100 m	kN	kN	kN	kN	kN	kN	kN	kN
16	91.3	111	115	136	130	153	144	170	158	187
18	116	141	146	172	164	194	182	215	201	237
19	129	157	162	192	183	216	203	239	223	264
20	143	174	180	212	203	239	225	265	248	292
22	173	210	218	257	246	290	272	321	300	354
24	205	251	259	306	292	345	324	382	357	421
25	223	272	281	332	317	374	351	414	387	457
26	241	294	304	359	343	405	380	448	418	494
28	279	341	353	416	398	469	440	520	485	573
32	365	445	461	544	519	613	575	679	634	748
36	462	564	583	688	657	776	728	859	802	947
38	515	628	650	767	733	864	811	957	894	1 055
40	570	696	720	850	812	958	899	1 061	990	1 169
44	690	842	871	1 028	982	1 159	1 088	1 283	1 198	1 414
48	821	1002	1037	1 223	1 169	1 379	1 294	1 527	1 426	1 683
52	964	1 176	1 217	1 436	1 372	1 619	1 519	1 792	1 674	1 975
56	1 118	1 364	1 411	1 665	1 591	1 877	1 762	2 079	1 941	2 291
60	1 283	1 566	1 620	1 912	1 826	2 155	2 022	2 386	2 229	2 630
64	1 460	1 781	1 843	2 175	2 078	2 452	2 301	2 715	-	-
68	1 648	2 011	2 081	2 455	2 346	2 768	2 597	3 065	-	-

NOTE — To calculate the aggregate breaking force multiply the figures given in col. 4,6, 8 and 10 by 1.220 and in col. 5, 7, 9 and 11 by 1.364

Table – 9B (Compacted Ropes)

Nominal Diameter	Approximate Mass		Minimum Breaking Force Corresponding to Rope Grade of			
			1770		1960	
	Fibre Core	Steel Core	Fibre Core	Steel Core	Fibre Core	Steel Core
	(CF)	(CWR)	(CF)	(CWR)	(CF)	(CWR)
(1)	(2)	(3)	(4)	(5)	(6)	(7)
mm	kg/100 m	kg/100 m	kN	kN	kN	kN
16	104	127	150	186	166	206
18	131	160	189	235	210	260
19	146	179	211	262	233	290
20	162	198	234	290	259	321
22	196	240	283	351	313	389
24	233	285	336	418	373	463
25	253	309	365	454	404	502
26	274	335	395	491	437	543
28	318	388	458	569	507	630
32	415	507	598	743	662	823
36	525	642	757	941	838	1 041
38	585	715	843	1 048	934	1 160
40	648	792	935	1 161	1 035	1 286
44	784	958	1 131	1 405	1 252	1 556
48	933	1 140	1 346	1 672	1 490	1 851
52	1 095	1 338	1 579	1 962	1 749	2 173
56	1 270	1 552	1 832	2 276	2 028	2 520
60	1 458	1 782	2 103	2 613	2 328	2 893

Table 10 Mass and Breaking Force for 18 x 7 Class Ropes

(*Clause* 1, 4 and 5)

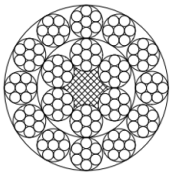
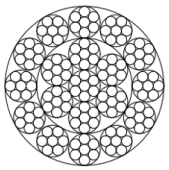
Typical Cross Section	Typical Construction	
 WITH FIBRE CORE (CF)  WITH STEEL CORE (CWS)	**Rope Construction**	**Strand Construction**
	17 × 7 (11×7:6 × 7-FC)	6-1
	17 x 7 (11 x 7 : 6 x 7 - 1 x 7)	6-1
	18 × 7 (12 × 7 : 6 × 7-FC)	6-1
	18 x 7 (12 x 7 : 6 x 7-1 x 7)	6-1
	18 x 19S (12 x 19S : 6 x 19S - FC)	9-9-1
	18 x 19S (12 x 19S : 6 x 19S – 1 x 19S)	9-9-1

Table – 10A

Nominal Diameter	Approximate Mass		Minimum Braking Force Corresponding to Rope Grade of							
			1570		1770		1960		2160	
	Fibre Core (CF)	Steel Core (CWR)	Fibre Core (CF)	Steel Core (CWR)	Fibre Core (CF)	Steel Core (CWR)	Fibre Core (CF)	Steel Core (CWR)	Fibre Core (CF)	Steel Core (CWR)
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
mm	kg/100 m	kg/100 m	kN	kN	kN	kN	kN	kN	kN	kN
6	13.8	14.5	--	--	20	21	22	23	25	26
7	18.8	19.7	--	--	28	28	31	32	34	35
8	24.5	25.7	32	33	36	37	40	41	44	45
9	31	32.6	41	42	46	47	51	52	56	57
10	38.3	40.2	50	52	56	58	62	64	69	71
11	46.3	48.6	61	62	68	70	76	78	83	86
12	55.1	57.9	72	74	81	84	90	93	99	102
13	64.7	67.9	85	87	95	98	106	109	116	120
14	75	78.8	98	101	111	114	122	126	135	139
16	98	103	128	132	144	149	160	165	176	181
18	124	130	162	167	183	188	202	208	223	230
19	138	145	181	186	204	210	225	232	248	256
20	153	161	200	206	226	232	250	257	275	283
22	185	195	242	249	273	281	302	311	333	343
24	220	232	288	297	325	335	360	370	396	408
25	239	251	313	322	352	363	390	402	430	443
26	259	272	338	348	381	393	422	435	465	479
28	300	315	392	404	442	455	490	504	540	556
32	392	412	512	527	577	595	639	659	705	726
36	496	521	648	668	731	753	809	833	892	918
38	553	580	722	744	814	839	902	929	994	1 023
40	612	643	800	824	902	929	999	1 029	1 101	1 134

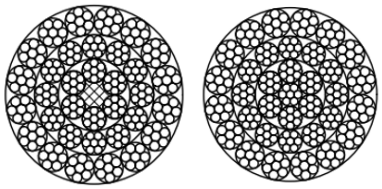
NOTE — To calculate the aggregate breaking force multiply the figures given in col. 4,6, 8 and 10 by 1.282 and in col. 5, 7, 9 and 11 by 1.319.

Table – 10B (Compacted Ropes)

Nominal Diameter	Approximate Mass		Minimum Breaking Force Corresponding to Rope Grade of			
			1770		1960	
	Fibre Core (CF)	Steel Core (CWR)	Fibre Core (CF)	Steel Core (CWR)	Fibre Core (CF)	Steel Core (CWR)
mm	kg/100 m	kg/100 m	kN	kN	kN	kN
6	15.4	16.9	22.3	23.6	24.7	26.1
7	20.9	23.0	30.4	32.1	33.6	35.5
8	27.3	30.1	39.6	41.9	43.9	46.4
9	34.6	38.1	50.2	53	55.6	58.7
10	42.7	47.0	62	65.5	68.6	72.5
11	51.7	56.9	75	79.2	83	87.7
12	61.5	67.7	89.2	94.3	98.8	104
13	72.2	79.4	105	111	116	123
14	83.7	92.1	121	128	134	142
16	109	120	159	168	176	186
18	138	152	201	212	222	235
19	154	170	224	236	248	262
20	171	188	248	262	274	290
22	207	227	300	317	332	351
24	246	271	357	377	395	418
25	267	294	387	409	429	453
26	289	318	419	443	464	490
28	335	368	486	513	538	569
32	437	481	634	671	702	743
36	553	609	803	849	889	940
38	617	679	895	946	991	1 047
40	683	752	991	1 048	1 098	1 160

Table 11 Mass and Breaking Force for 34(M) X 7 Class Ropes

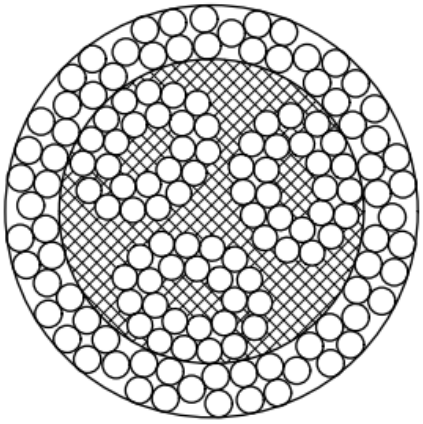
(*Clause* 1,4 and 5)

Typical Cross Section	Typical Construction	
	Rope Construction	**Strand Construction**
 WITH FIBRE CORE (CF) WITH STEEL CORE (CWS)	34 x 7 (17 × 7 : 11 x 7/6 × 7 - FC)	6-1
	34 x 7 (17 x 7 : 11 x 7/6 x 7 - 1 x 7)	6-1
	36 x 7 (18 × 7 : 12 x 7/6 × 7 - FC)	6-1
	36 x 7 (18 x 7 : 12 x 7/6 x 7 – 1 x 7)	6-1

Nominal Diameter	**Approximate Mass**		**Minimum Braking Force Corresponding to Rope Grade of**					
	Fibre Core	Steel Core	1570		1770		1960	
			Fibre Core	Steel Core	Fibre Core	Steel Core	Fibre Core	Steel Core
	(CF)	(CWR)	(CF)	(CWR)	(CF)	(CWR)	(CF)	(CWR)
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
mm	kg/100 m	kg/100 m	kN	kN	kN	kN	kN	kN
12	56.2	57.9	71	72	80	81	88	90
13	65.9	67.9	83	84	93	95	103	105
14	76.5	78.8	96	98	108	110	120	122
16	99.9	103	125	128	141	144	157	160
18	126	130	159	162	179	183	198	202
19	141	145	177	180	199	203	221	225
20	156	161	196	200	221	225	245	250
22	189	195	237	242	267	273	296	302
24	225	232	282	288	318	325	352	359
25	244	251	306	312	345	352	382	390
26	264	272	331	338	374	381	414	422
28	306	315	384	392	433	442	480	489
32	400	412	502	512	566	577	627	639
36	506	521	635	648	716	730	793	809
38	563	580	708	722	798	814	884	901
40	624	643	784	800	884	902	979	999
44	755	778	949	968	1 070	1 091	1 185	1 208
48	899	926	1 129	1 152	1 273	1 298	1 410	1 438
52	1055	1087	1 325	1 352	1 794	1 524	1 655	1 687
56	1224	1261	1 537	1 568	1 733	1 767	1 919	1 957

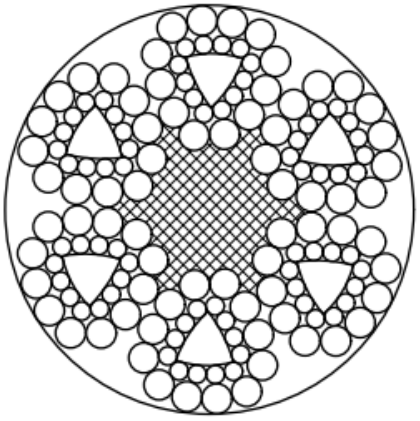
NOTE — To calculate the aggregate breaking force multiply the figures given in col. 4, 6 and 8 by 1.33 and in col. 5, 7 and 9 by 1.346.

Table 12 Mass and Breaking Force for 12 X 6 (6-0) : 3 x 24 (15/9-Fibre) Construction Ropes
(*Clause* 1, 4 and 5)

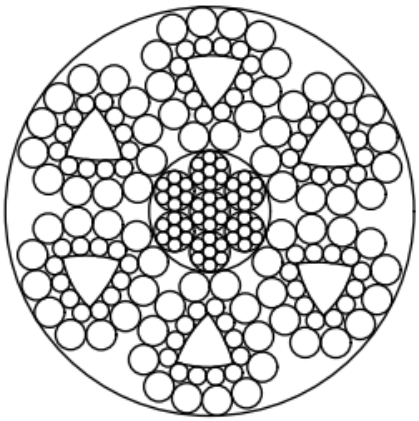


Nominal Diameter	Approximate Mass	Minimum Breaking Force Corresponding to Rope Grade of		
		1570	1770	1960
(1)	(2)	(3)	(4)	(5)
mm	kg/100m	kN	kN	kN
8	23.2	30	34	38
9	29.3	38	43	48
10	36.2	47	53	59
11	43.8	57	64	71
12	52.1	68	76	85
13	61.2	80	90	99
14	71	92	104	115
16	92.7	121	136	151
18	117	153	172	191
19	131	170	192	212
20	145	188	212	235
22	175	228	257	285
24	209	271	306	339
25	226	294	332	368
26	245	318	359	397
28	284	369	416	461
32	371	482	544	602
36	469	610	688	762
38	523	680	767	849
40	579	754	850	941
NOTE — To calculate the aggregate breaking force multiply the figures given in col. 4, 6 and 8 by 1.283.				

Table 13 Mass and Breaking Force for 6 X V 25(12/12 - Δ) Construction Ropes
(*Clause* 1, 4 and 5)



WITH FIBRE CORE (CF)



WITH STEEL CORE (CWR)

Nominal Diameter	**Approximate Mass**		**Minimum Braking Force Corresponding to Rope Grade of**					
	Fibre Core	Steel Core	1570		1770		1960	
			Fibre Core	Steel Core	Fibre Core	Steel Core	Fibre Core	Steel Core
	(CF)	(CWR)	(CF)	(CWR)	(CF)	(CWR)	(CF)	(CWR)
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
mm	kg/100 m	kg/100 m	kN	kN	kN	kN	kN	kN
13	69.3	75.5	93	99	105	111	116	123
14	80.4	87.6	108	114	122	129	135	143
16	105	114	141	150	159	169	176	187
18	133	145	179	189	201	213	223	236
19	148	161	199	211	224	238	248	263
20	164	179	220	234	249	263	275	292
22	198	216	267	283	301	319	333	353
24	236	257	317	336	358	379	396	420
25	256	279	344	365	388	412	430	456
26	277	302	373	395	420	445	465	493
28	321	350	432	458	487	516	539	572
32	420	458	564	598	636	674	704	747
36	531	579	714	757	805	853	892	945
38	592	645	796	843	897	951	993	1 053
40	656	715	882	934	994	1054	1 101	1 167
44	794	865	1 067	1 131	1 203	1 275	1 332	1 412
48	945	1 030	1 270	1 346	1 431	1 517	1 585	1 680

NOTE — To calculate the aggregate breaking force multiply the figures given in col. 4, 6 and 8 by 1.177 and in col. 5, 7 and 9 by 1.25. In case of Δ wire, 3 or more round wires may be used.

Table 14 Mass and Breaking Force for 35(W) x 7 Class Ropes
(*Clause* 1, 4 and 5)

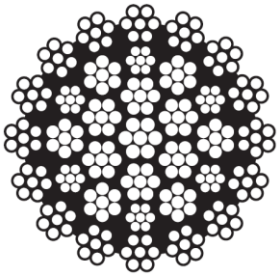
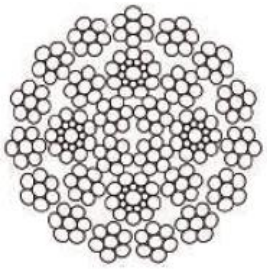
Typical Cross Section	Typical Construction	
	Rope Construction	**Strand Construction**
 WITH STEEL CORE (CWS)	28 x 7 (16 x 7 : 4 x 7 + 4 x 7 - 4 x 7)	6-1
	29 x 7 (16 x 7 : 6F x 7 – 6 x 7 – 1 x 7)	6-1
	35 x 7 (16 x 7 : 6 x 7 + 6 x 7 – 6 x 7 – 1 x 7)	6-1
	40 x 7 [18 x 7 : 7 x 7 + 7 x 7 - 7 x 7 – 1 x 7)	6-1
 WITH STEEL CORE (CWR)	35 x 19S (16 x 19S : 6 x 19S + 6 x 19S - 6 x 19S - 1 x 19S)	9-9-1
	15 x 7 : IWRC	6-1
	16 x 7 : IWRC	6-1

Table – 14A

Nominal Diameter	**Approximate Mass**		**Minimum Braking Force Corresponding to Rope Grade of**							
			1570		1770		1960		2160	
	Fibre Core	Steel Core	Fibre Core	Steel Core	Fibre Core	Steel Core	Fibre Core	Steel Core	Fibre Core	Steel Core
	(CF)	(CWR)	(CF)	(CWR)	(CF)	(CWR)	(CF)	(CWR)	(CF)	(CWR)
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
mm	kg/100 m	kg/100 m	kN	kN	kN	kN	kN	kN	kN	kN
8	-	29.1	-	36.2	-	40.8	-	45.2	-	49.8
10	-	45.4	-	56.5	-	63.7	-	70.6	-	77.8
11	-	54.9	-	68.4	-	77.1	-	85.4	-	94.1
12	-	65.4	-	81.4	-	91.8	-	102	-	112
13	-	76.7	-	95.5	-	108	-	119	-	131
14	-	89	-	111	-	125	-	138	-	152
16	-	116	-	145	-	163	-	181	-	199
18	-	147	-	183	-	206	-	229	-	252
19	-	164	-	204	-	230	-	255	-	281
20	-	182	-	226	-	255	-	282	-	311
22	-	220	-	274	-	308	-	342	-	376
24	-	262	-	326	-	367	-	406	-	448
25	-	284	-	353	-	398	-	441	-	486
26	-	307	-	382	-	431	-	477	-	526
28	-	356	-	443	-	500	-	553	-	610
29	-	382	-	475	-	536	-	593	-	654
30	-	409	-	509	-	573	-	635	-	700
32	-	465	-	579	-	652	-	723	-	796

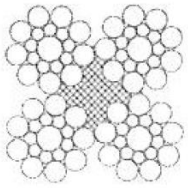
34	-	525	-	653	-	737	-	816	-	899
35	-	556	-	692	-	781	-	864	-	953
36	-	588	-	732	-	826	-	914	-	1 008
38	-	656	-	816	-	920	-	1 019	-	1 123
40	-	726	-	904	-	1 020	-	1 129	-	1 244
42	-	801	-	997	-	1 124	-	1 245	-	1 372
44	-	879	-	1 094	-	1 234	-	1 366	-	1 505
45	-	919	-	1 145	-	1 290	-	1 429	-	1 575
46	-	961	-	1196	-	1 348	-	1 493	-	1 645
48	-	1 046	-	1 302	-	1 468	-	1 626	-	1 792
50	-	1 135	-	1 413	-	1 593	-	1 764	-	1 944
51	-	1 181	-	1 470	-	1657	-	1 835	-	2 023
52	-	1 228	-	1 528	-	1 723	-	1 908	-	2 103
54	-	1 324	-	1 648	-	1 858	-	2 058	-	2 267
55	-	1 373	-	1 710	-	1 928	-	2 134	-	2 352
56	-	1 424	-	1772	-	1 998	-	2 213	-	2 439
58	-	1 527	-	1 901	-	2 144	-	2 374	-	2 616
60	-	1 634	-	2 035	-	2 294	-	2 540	-	2 799

Table – 14 B (Compacted Ropes)

Nominal Diameter	**Approximate Mass**		**Minimum Braking Force Corresponding to Rope Grade of**			
			1770		1960	
	Fibre Core	Steel Core	Fibre Core	Steel Core	Fibre Core	Steel Core
	(CF)	(CWR)	(CF)	(CWR)	(CF)	(CWR)
(1)	(2)	(3)	(4)	(5)	(6)	(7)
mm	kg/100 m	kg/100 m	kN	kN	kN	kN
10	-	51	-	72.6	-	80.4
11	-	61.7	-	87.8	-	97.2
12	-	73.4	-	105	-	116
13	-	86.2	-	123	-	136
14	-	100	-	142	-	158
16	-	131	-	186	-	206
18	-	165	-	235	-	260
19	-	184	-	262	-	290
20	-	204	-	290	-	321
22	-	247	-	351	-	389
24	-	294	-	418	-	463
25	-	319	-	454	-	502
26	-	345	-	491	-	543
28	-	400	-	569	-	630
29	-	429	-	610	-	676
30	-	459	-	653	-	723
32	-	522	-	743	-	823
34	-	590	-	839	-	929
35	-	625	-	889	-	984
36	-	661	-	941	-	1 041
38	-	736	-	1 048	-	1 160
40	-	816	-	1 161	-	1 286
42	-	900	-	1 280	-	1 418

44	-	987	-	1405	-	1 556
45	-	1 033	-	1 470	-	1 627
46	-	1 079	-	1 536	-	1 700
48	-	1 175	-	1 672	-	1 851
50	-	1275	-	1 814	-	2 009
51	-	1 327	-	1 888	-	2 090
52	-	1 379	-	1 962	-	2 173
54	-	1 487	-	2 116	-	2 343
55	-	1 543	-	2195	-	2 431
56	-	1 599	-	2 276	-	2 520
58	-	1 716	-	2 441	-	2 703
60	-	1 836	-	2 613	-	2 893

Table 15 Mass and Breaking Force for 4x19 Class and 4 x 36 Class Ropes
(*Clause* 1, 4 and 5)

Typical Cross Section	Typical Construction	
	Rope Construction	**Strand Construction**
 WITH FIBRE CORE (CF)	4 x 19S	9-9-1
	4 x 25F	12-6F-6-1
	4 x 26SW	10-5+5-5-1
	4 x 31SW	12-6+6-6-1
	4 x 36SW	14-7+7-7-1
	4 x 41SW	16-8+8-8-1

Nominal Diameter	**Approximate Mass**		**Minimum Braking Force Corresponding to Rope Grade of**					
			1570		1770		1960	
	Fibre Core	Steel Core	Fibre Core	Steel Core	Fibre Core	Steel Core	Fibre Core	Steel Core
	(CF)	(CWR)	(CF)	(CWR)	(CF)	(CWR)	(CF)	(CWR)
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(8)
mm	kg/100 m	kg/100 m	kN	kN	kN	kN	kN	kN
8	26.2	-	36.2	-	40.8	-	45.2	-
9	33.2	-	45.8	-	51.6	-	57.2	-
10	41	-	56.5	-	63.7	-	70.6	-
11	49.6	-	68.4	-	77.1	-	85.4	-
12	59	-	81.4	-	91.8	-	102	-
13	69.3	-	95.5	-	108	-	119	-
14	80.4	-	111	-	125	-	138	-
16	105	-	145	-	163	-	181	-
18	133	-	183	-	206	-	229	-
20	164	-	226	-	255	-	282	-
22	198	-	274	-	308	-	342	-
24	236	-	326	-	367	-	406	-
25	256	-	353	-	398	-	441	-
26	277	-	382	-	431	-	477	-
28	321	-	443	-	500	-	553	-
29	345	-	475	-	536	-	593	-
30	369	-	509	-	573	-	635	-
32	420	-	579	-	652	-	723	-

34	474	-	653	-	737	-	816	-
36	531	-	732	-	826	-	914	-
38	592	-	816	-	920	-	1 019	-
40	656	-	904	-	1 020	-	1 129	-
42	723	-	997	-	1 124	-	1 245	-
44	794	-	1094	-	1 234	-	1 366	-
45	830	-	1145	-	1 290	-	1 429	-
48	945	-	1302	-	1 468	-	1 626	-