INTERNATIONAL STANDARD

ISO 10092

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High breaking load steel wire ropes — Specifications

Câbles en acier à haute résistance — Spécifications

Reference number
ISO 10092:1990(E)

Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established 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. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

International Standard ISO 10092 was prepared by Technical Committee ISO/TC 105, *Steel wire ropes*.

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High breaking load steel wire ropes — Specifications

1 Scope

This International Standard specifies a range of round-strand steel wire ropes for use where a higher-than-normal strength to diameter ratio is required.

It is not applicable to ropes to be used for any of the following purposes:

— mine hoisting;

— aircraft controls;

— deep drilling;

— aerial ropeways and funiculars;

— lifts and elevators.

2 Normative references

The following standards contain provisions which, through reference in this text, constitute provisions of this International Standard. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this International Standard are encouraged to investigate the possibility of applying the most recent editions of the standards indicated below. Members of IEC and ISO maintain registers of currently valid International Standards.

ISO 2232:1990, *Round drawn wire for general purpose non-alloy steel wire ropes and for large diameter steel wire ropes — Specifications.*

ISO 3108:1974, *Steel wire ropes for general purposes — Determination of actual breaking load.*

ISO 3178:1988, *Steel wire ropes for general purposes — Terms of acceptance.*

ISO 4346:1977, *Steel wire ropes for general purposes — Lubricants — Basic requirements.*

3 Classification of wire ropes

The classification of ropes complying with this International Standard is given in table 1. The ropes shall have six strands and steel cores.

Table 1 — Classification

Class	Description	Diameter range mm
6 × 19	8 to 12 outer wires in strand, two or three layers of wire over a centre wire. Wires equal laid.	9 to 52
6 × 37	14 to 18 outer wires in strand, three or more layers of wire over a centre wire. Wires equal laid.	9 to 60

4 Materials

NOTE 1 Material requirements are part of the terms of acceptance of the rope and may form the subject of a future International Standard.

4.1 Rope wire

The steel wire shall comply with ISO 2232.

4.1.1 Tensile grade

The tensile grade of wire shall be stated by the rope manufacturer.

4.1.2 Surface finish

The wire shall be either bright or B zinc-coated.

4.2 Core

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

4.3 Rope lubricant

The lubricants shall comply with ISO 4346.

5 Characteristics

5.1 Strand

5.1.1 The strand shall be uniform in manufacture and shall be free from slack wires.

5.1.2 In equal lay construction, all wires of the strand shall be stranded in one operation. When the centre wire of the strand becomes so large that it is considered undesirable, it is permissible (at the manufacturer's discretion) to replace it with a multi-wire strand manufactured in a separate stranding operation.

5.1.3 The centre wire of a strand shall be of a size sufficient to provide support to enable the covering wires to be evenly laid.

5.2 Rope

5.2.1 The rope shall be uniform in manufacture and the strands shall lie tightly on the core. When uncoiled and under no load the rope shall not be wavy.

5.2.2 All strands shall be of the same construction and lay. The length of lay of the strands in a rope shall not vary significantly.

5.2.3 The core shall be of a size sufficient to provide support to enable the covering strands to be evenly laid.

5.2.4 In galvanized ropes, all the wires shall be zinc-coated, including those of the steel core.

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

5.2.6 The free ends of all wire ropes shall be whipped as security against untwisting.

5.3 Rope lubrication

Wire ropes shall be appropriately lubricated.

5.4 Rope diameter

5.4.1 Nominal diameter, d

The nominal diameter, d, expressed in millimetres, 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 specified in ISO 3178.

5.4.3 Tolerance

The actual rope diameter shall be within $^{+4}_{-1}$ % of the nominal diameter.

5.5 Length

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

$\leqslant$ 400 m: $^{+5}_{0}$ %

$>$ 400 m: $^{+20}_{0}$ m for each 1 000 m or part thereof.

The rope length shall be measured under no load.

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

The lengths of test pieces are specified in ISO 3108.

5.6 Mass, M

The approximate rope mass, M, expressed in kilograms per 100 m, is given by

$$M = Kd^2$$

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 coefficient for the mass per unit length for a given rope construction, in kilograms per 100 metre square millimetres [kg/(100 m·mm²)] (see table 2).

Approximate masses are given in table 3.

5.7 Minimum breaking force, F_0

The minimum breaking force, expressed in kilonewtons, is that force which shall be reached in the tensile test to destruction specified in ISO 3108. Minimum breaking forces are given in table 3.

The values are calculated by

$$F_0 = \frac{K' d^2 R_0}{1000}$$

where

F_0 is the minimum breaking force, in kilonewtons;

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

K' is the empirical factor for the minimum breaking force for a given rope construction (see table 2);

R_0 is the wire tensile grade used for the minimum breaking force calculations (see table 4).

Table 2 — Factors K and K'

Class	Rope mass factor K kg/(100 m·mm²)	Minimum breaking force factor K'
6 × 19 6 × 37	0,398	0,356

Table 3 — Physical properties

Nominal diameter d mm	Minimum breaking force kN	Minimum breaking load t	Approximate mass of the rope kg/100 m
9	59,4	6,06	32,2
10	73,3	7,47	39,8
11	88,7	9,04	48,2
12	106	10,8	57,3
13	124	12,6	67,3
14	144	14,7	78
16	188	19,2	101,9
18	238	24,3	129
20	293	29,9	159,2
22	355	36,2	192,6
24	402	41	229,2
26	472	48,1	269
28	547	55,8	312
32	715	72,9	407,6
36	904	92,2	515,8
40	1 120	114	636,8
44	1 310	134	770,5
48	1 560	159	917
52	1 830	187	1 076,2
56	2 120	216	1 248,1
60	2 440	249	1 432,8

Table 4 — Notional values of wire tensile grade for purposes of calculation

Nominal rope diameter d mm	R_0 N/mm²
$9 \leqslant d \leqslant 24$	2 060
$24 < d \leqslant 42$	1 960
$42 < d \leqslant 61$	1 900

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