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Fibre ropes — General specification

Cordages — Spécifications générales

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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 9554 was prepared by Technical Committee ISO/TC 38, *Textiles*.

Annex A of this International Standard is for information only.

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Fibre ropes — General specification

1 Scope

This Standard specifies the general characteristics of fibre ropes whatever their constituent material.

It applies to all ropes conforming to ISO 1140, ISO 1141, ISO 1181, ISO 1346 and ISO 1969.

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 1140:1990, *Ropes — Polyamide — Specification.*

ISO 1141:1990, *Ropes — Polyester — Specification.*

ISO 1181:1990, *Ropes — Manila and sisal — Specification.*

ISO 1346:1990, *Ropes — Polypropylene — Specification.*

ISO 1969:1990, *Ropes — Polyethylene — Specification.*

ISO 2307:1990, *Ropes — Determination of certain physical and mechanical properties.*

3 General

Fibre ropes shall conform to the particular specifications given in the standards referred to in clause 2 and the requirements given in this International Standard.

The following characteristics shall be measured under tension:

— linear density;

— lay.

The tension to be used for measurements of the ropes shall be as defined in ISO 2307.

4 Manufacture

4.1 Constituent materials

4.1.1 Natural fibres (see ISO 1181)

The constituent yarns of the strands shall be made exclusively of new manila in the case of manila ropes and new sisal in the case of sisal ropes, with an approximate density of:

— manila: 1,35 kg/dm^3;

— sisal: 1,35 kg/dm^3.

4.1.2 Man-made fibres

Apart from the identification yarn, the yarns constituting the strands shall comply with the requirements given in table 1.

Table 1

Fibre	Approximate density kg/dm^3	Type of yarn	International Standard
Polyamide	1,14	Multifilament	ISO 1140
Polyester	1,38	Multifilament	ISO 1141
Polypropylene	0,91	Monofilament, multifilament, film	ISO 1346
Polyethylene	0,96	Monofilament	ISO 1969

The rope yarns shall not contain fibres which have been used or recovered.

4.2 Construction

Unless otherwise specified, hawser-laid ropes[1] shall be Z twist (right-hand lay), their strands S twist and their roping yarns Z twist.

Eight-strand plaited ropes shall consist of four pairs of strands, each alternate pair consisting of two S twist strands and two Z twist strands.

Each strand shall consist of an equal number of rope yarns sufficient to provide the characteristics specified in the standards dealing with each fibre (see clause 2).

4.3 Structure

The ropes and their strands shall be continuous, without splice.

4.4 Treatment

4.4.1 Polyamide and polyester ropes

4.4.1.1 Polyamide and polyester ropes shall contain not more than 0,05 % by mass of titanium dioxide.

4.4.1.2 They shall be subjected to heat treatment to fix the lay and dimensional stability. This treatment shall ensure dimensional stability of the strands so that subsequent shrinkage on use shall be minimal.

The ropes are generally supplied in their natural state, i.e. without any impregnation or coating treatment. At the purchaser's request, they may be coated or impregnated to establish particular characteristics. The nature of the coating or impregnation product is left to the initiative of the manufacturer. The treatment applied shall not reduce the tensile strength of the rope.

The increase in mass of the rope due to the treatment shall not exceed 5 % of the mass of the rope in its natural state, unless this is agreed separately between the manufacturer and the purchaser.

4.4.2 Polypropylene and polyethylene ropes

The polypropylene shall be stabilized against deterioration due to sunlight. Any ultra-violet (UV) inhibiting system may be used, such as pigmentation using carbon black, iron(III) oxide (Fe_2O_3) or any other colouring product or special UV inhibitor.

NOTE 1 The stabilization of the polyethylene against deterioration due to sunlight may be improved by these systems.

5 Lay

The maximum lay shall be as given in table 2, in which the values are for rope subjected to the tension given in ISO 2307.

Table 2

Constituent material of the rope	Maximum lay Three-strand	Four-strand	Eight-strand
Manila	3,5 rn	4,5 rn	—
Sisal	3,5 rn	4,5 rn	—
Polyamide	3,5 rn	—	3,8 rn
Polyester	3,5 rn	—	3,8 rn
Polypropylene	3,7 rn	4,8 rn	4,0 rn
Polyethylene	3,6 rn	4,8 rn	—

rn = reference number of rope

1) The ropes are coreless when they have three strands, but more frequently have a central core when they have four strands.

6 Main characteristics and tolerances

The main characteristics of the ropes shall be as follows:

a) **linear density** (net mass, in grams per metre) measured when the rope is subjected to the tension given in ISO 2307, with tolerances of:

   1) ± 10 % for a rope of reference number 4 to 8,

   2) ± 8 % for a rope of reference number from 10 to 14,

   3) ± 5 % for a rope reference number of 16 and above;

b) **breaking strength;**

c) **reference number**, corresponding to the approximate diameter measured at zero tension.

These characteristics are specified in the standards dealing with each fibre (see clause 2).

Other characteristics, for example the diameter of the circumscribed circle and the elongation of the rope under specific tensile conditions, may be specified, subject to agreement between the manufacturer and the purchaser, where applicable with submission of a sample.

7 Marking

7.1 General

The ropes shall be marked using a yarn or tape yarn, as defined below, of an easily identifiable colour within the article so as to remain recognizable despite soiling, soaking or discoloration during use.

tape yarn: A straight continuous strip, of thickness which is small compared with its width, obtained by cutting a film or by direct extrusion of a man-made textile material.

NOTES

2 This rot-proof strip of colour, marked with required information concerning the rope, is placed inside a strand.

3 This expression is preferred to the French term "bolduc".

7.2 Rope with a reference number less than 12

Incorporate a coloured (see 7.4) yarn or tape yarn in a strand.

7.3 Rope with reference number greater than or equal to 12

Incorporate in one strand a dyed tape yarn of minimum width 3 mm, marked with the reference number of the standard relating to the fibre and a reference by means of which the manufacturer can be identified.

The maximum interval between two consecutive markings shall be 1 m.

7.4 Colour of the yarn or tape yarn

The colour of the yarn or tape yarn shall be as given in table 3.

Table 3

Material	Colour	International Standard
Manila	Black	ISO 1181
Sisal	Red	ISO 1181
Polyamide	Green	ISO 1140
Polyester	Blue	ISO 1141
Polyethylene	Orange	ISO 1969
Polypropylene	Brown	ISO 1346

8 Labelling

Each coil shall have a label, which is firmly fixed in place, giving the following information:

— the constituent material;

— identification of manufacturer;

— the reference number;

— the delivered length;

— a reference to the standard relating to the constituent material (e.g. ISO 1141 for polyester ropes).

9 Packaging, invoicing and delivered length

9.1 Packaging and invoicing

When the ropes are invoiced by gross mass, excluding packaging, the mass of the packaging shall not exceed 1,5 % of the gross mass of the ropes.

9.2 Delivered length

9.2.1 Standard delivered length

Unless otherwise specified, the delivered length shall be the length measured at zero tension.

The tolerance on delivered length shall be

± 5 % for ropes with a reference number less than or equal to 14,

± 3 % for ropes with a reference number greater than 14,

on condition that the gross mass corresponding to the delivered length is not less than the product of the minimum linear density and the theoretical delivered length.

Standard delivered lengths are as follows:

100 m - 200 m - 220 m

Other lengths may be supplied for special orders.

9.2.2 Shorter delivered length due to sampling

To carry out tests at the request of the purchaser, test pieces may be taken from the ordered length of rope. The length of rope delivered will then be less than the ordered length because of these test pieces (which are considered to be part of the delivery).

Annex A
(informative)

Examples of rope construction corresponding to fixed specifications

Examples of rope construction complying with this International Standard are given in table A.1

Table A.1

Main characteristics	Type A Three-strand ropes without core	Type B Four-strand ropes with core[1]	Type C Eight-strand ropes without core
Rope twist	Z twist in accordance with 4.2		—
Rope lay	In accordance with clause 5		
Type of plait	—	—	Strands plaited in pairs
Lay of plait	—	—	In accordance with clause 5
Number of yarn	Not specified, see 4.2		
Rope yarn	Fibre in accordance with clause 3 Purity, type of construction, linear density and twist in accordance with clause 4 All the rope yarns (including the core yarns) to be made up of yarns of the same fibre		
Rope strand	Made by assembling rope yarns Minimum number of yarns: 2 In each strand, the number of filaments to be the same (for type A and B ropes of reference number 36 or more, as well as for all type C ropes, small deviations are permitted.[2]		
	—		Pairs of two strands, both of S twist, and pairs of two strands, both of Z twist.
Rope core	—	Plaited sets of rope yarns, the part of the yarn mass comprising the rope core not being specified	—

1) Type B of reference number greater then 12 may be made without a core.

2) For these ropes, the number of yarns in each strand may differ by ± 2,5 % from the mean number of yarns in a strand.

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