
Fibre ropes — General specifications

Cordages en fibres — 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.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The main task of technical committees is to prepare International Standards. 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.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights.

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

This third edition cancels and replaces the second edition (ISO 9554:2005), which has been technically revised.

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Fibre ropes — General specifications

1 Scope

This International Standard specifies the general characteristics of fibre ropes and their constituent materials. It is intended to be used in conjunction with the standards for the individual types of fibre rope, which cover the physical properties and specific requirements for that particular product type.

This International Standard also gives some information on the use of fibre ropes and also on their inspection and retirement criteria.

This International Standard does not intend to address all of the safety matters associated with its use. It is the responsibility of the user to select a rope type of the size and with the physical properties to meet the requirements of the application and to determine the applicability of regulatory limitations prior to its use.

2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

- ISO 1140, *Fibre ropes — Polyamide — 3-, 4- and 8-strand ropes*
- ISO 1141, *Fibre ropes — Polyester — 3-, 4- and 8-strand ropes*
- ISO 1968, *Fibre ropes and cordage — Vocabulary*
- ISO 2307, *Fibre ropes — Determination of certain physical and mechanical properties*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 1968 apply.

4 Manufacture

4.1 Constituent materials

The following materials are considered in this International Standard:

- a) natural fibres:
 - sisal;
 - manila;
 - hemp;

- b) man-made fibres:
- polyamide;
 - polyester;
 - polypropylene;
 - polyethylene;
 - mixed polyolefin;
 - polyester/polyolefin dual fibres;
 - high modulus polyethylene.

Typical characteristics for these materials are given in Annex A. Specific applications should involve technical discussions with rope manufacturers.

4.2 Construction and structure

Unless otherwise specified, 3-, 4- and 6-strand laid ropes shall be Z-twist (right-hand lay), their strands S-twist and their roping yarns Z-twist.

The 8-strand braided ropes shall consist of four S-twist strands and four Z-twist strands arranged so that S-twist strands alternate (individually or in pairs) with Z-twist strands (individually or in pairs).

The 12-strand braided ropes shall consist of six S-twist strands and six Z-twist strands arranged so that S-twist strands alternate (individually or in pairs) with Z-twist strands (individually or in pairs).

A double-braided rope shall consist of a number of strands that are braided to form a core, around which additional strands are braided to form a sheath. The core lies coaxially within the sheath. The number of strands varies, based upon the size of the rope.

A parallel rope construction consists of a number of sub-ropes protected by a non-load-bearing cover.

Each strand shall consist of an equal number of rope yarns sufficient to provide the characteristics specified in the International Standard for the relevant product. For ropes of reference number 36 or higher, the number of yarns in each strand may differ by one yarn or $\pm 2,5$ % from the intended number of yarns in the strand.

The ropes and their strands shall be continuous, without splice for standard delivered lengths or shorter lengths.

Yarns may be joined as necessary.

The strands can be assembled yarns as well.

NOTE National legislations can place additional requirements concerning rope construction.

4.3 Treatment

4.3.1 Polyamide and polyester ropes

4.3.1.1 Polyamide and polyester laid ropes that are required to have a heat setting on the rope to ensure lay and dimensional stability are designated as type 1 ropes in ISO 1140 and ISO 1141.

4.3.1.2 In other cases, polyamide and polyester laid ropes that are not required to have a heat setting on the rope are designated as type 2 ropes in ISO 1140 and ISO 1141.

4.3.1.3 The ropes shall be supplied in their natural state without additives to weight the rope or coating treatment.

The fibre producer or the rope manufacturer may apply lubricants for enhanced performance. The total amount of additives or extractable materials shall not exceed 2,5 % in mass.

4.3.1.4 The colour of the rope shall be natural, unless otherwise requested.

Upon request of the purchaser, the manufacturer may use a coating or impregnation of the product for special applications.

4.3.1.5 The figures for linear density and minimum breaking force in ISO 1140 and in ISO 1141 are the same for type 1 and type 2 ropes.

4.3.2 Polypropylene and polyethylene ropes

Polypropylene and polyethylene ropes shall be protected against deterioration due to sunlight (UV).

The inhibiting system used should ensure the expected performance in usage under the foreseen geographical areas for applications, provided that the manufacturer is kept informed by the user.

4.3.3 Manila and sisal

4.3.3.1 General

All ropes of manila and of sisal shall be made exclusively of new fibres.

4.3.3.2 Manila

A cordage oil lubricant of suitable quality shall be applied. The lubricant shall not impart an offensive odour to the finished rope. The percentage of extractable matter based on the dry weight of the rope shall not be less than 11,5 % nor more than 16,5 %.

When specified, the rope shall have a mildew-resistant treatment.

Anti-bacterial additives for manila may be added to extend the performance of the natural fibre when requested by the purchaser.

4.3.3.3 Sisal

A cordage oil lubricant of suitable quality shall be applied. The lubricant shall not impart an offensive odour to the finished rope. The percentage of extractable matter based on the dry weight of the rope shall not be more than 11,5 % for an un-oiled product and not more than 16,5 % for an oiled product.

When specified, the rope shall be free from any oils and sold as un-oiled rope.

Anti-bacterial additives for sisal may be added to extend the performance of the natural fibre when requested by the purchaser.

4.4 Workmanship

4.4.1 The finished rope shall contain no cuts, kinks or soft spots caused by change in lay or pitch length, hockles, chafed or damaged sections, or broken, loose or projecting ends in the rope or the strands.

4.4.2 The unspliced ends of all ropes shall be cut off squarely and shall be securely whipped, taped or heat-sealed.

5 Lay length or braid pitch

The manufacturer shall establish the lay length or the braid pitch of the rope according to its intended use, or based upon the purchaser's acceptance.

NOTE For a given reference number of rope, the smaller the lay length or braid pitch the harder the rope will be; this hardness can affect the estimated breaking strength of the rope.

6 Requirements

The main requirements shall be those specified in the relevant International Standard for the product and shall include the following:

- a) linear density;
- b) minimum breaking force;
- c) reference number.

The corresponding test methods are specified in ISO 2307.

Other requirements, for example the lay length, the braid pitch, 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 the submission of a sample.

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7 Marking and labelling

7.1 Marking

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7.1.1 General

The identification of the material, quality and origin of a fibre rope conforming to this International Standard shall be marked using a tape placed within the article (see 7.1.3) so as to remain recognizable despite soiling, soaking or discoloration during use.

The tape shall be at least 3 mm wide, and shall be printed with the number of the relevant International Standard, and a reference identifying the manufacturer. The maximum distance between two consecutive markings shall be 0,5 m.

7.1.2 Ropes of reference number less than 14

These do not need to be marked, unless specified in a product standard.

7.1.3 Ropes of reference number equal to or greater than 14

A marker tape as defined in 7.1.1 shall be incorporated into the centre of one strand for 3-, 4-, 8- and 12-strand ropes. Double-braided ropes shall have a marker tape in or outside the core.

For covered ropes, the marking tape shall be incorporated between the cover and the core or within the core.

7.2 Labelling

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

- constituent material;
- identification of manufacturer and country of origin;
- reference number;
- delivered length;
- declaration of conformity to this International Standard relating to the constituent material (e.g. “in accordance with ISO 9554”).

8 Packaging, invoicing and delivered length

8.1 Packaging and invoicing

8.1.1 The packaging unit may be a reel, a coil, a hank, a box, a bag or as specified by the purchaser.

8.1.2 The finished rope shall be supplied in a package, so that it can be dispensed freely without entanglement of any kind.

8.1.3 Either the unit mass or the length may be used to invoice the rope. When the gross mass is used for invoicing, the mass of the packaging shall not exceed 1,5 % of the gross mass of the rope.

8.2 Delivered length

8.2.1 Standard delivered length

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The length of the coil shall be determined by dividing the mass of the coil by the mass per metre of the rope, determined in accordance with ISO 2307.

The limit deviation on delivered length shall be

- -5 % for ropes with a reference number less than or equal to 14, or
- -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 the following:

100 m; 183 m; 200 m; 220 m; 366 m.

Other lengths may be supplied for special orders.

8.2.2 Shorter delivered length due to sampling

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

In the event that a specific length is required and testing is required, the purchaser may be invoiced the additional length or mass of the rope required to perform such testing.

9 Testing

9.1 The testing of the finished rope shall be conducted as specified in the applicable International Standard and in the purchase order or contract.

9.2 The required length and number of test samples shall be removed from the selected test reels as outlined in 8.2.2, if required.

9.3 Test reports shall be prepared in accordance with the contract or the purchase order.

10 Visual quality control

10.1 Responsibility for inspection

Unless otherwise specified in the contract or in the purchase order, the rope manufacturer is responsible for the performance of all quality-control requirements specified in this International Standard and in the applicable fibre rope standard. The purchaser shall have the option to have a representative present during the control by the manufacturer. The purchaser, at his/her expense, reserves the right to perform or have a third party perform any of the controls set forth in the specification where controls are deemed necessary to ensure that ropes conform to specifications. A representative of the rope manufacturer shall have the option to be present during these controls.

10.2 Finished-rope visual control

Each sample shall be subject to visual examination. The samples shall be selected at random. If any defects are noted in the original test units, an equal number of additional test units shall be selected at random and, if any specified defects are noted, the entire lot shall be rejected. See Annex B.

11 Certification

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When requested by the purchaser, the manufacturer of the rope shall issue certificates of conformity with the relevant International Standard when invoicing. These certificates shall always be available for any of the phases of the distribution and/or usage of the rope.

If certification is required, it shall be requested at the time of placing the order.

12 Instructions for use

The manufacturer shall provide the purchaser with a set of instructions for the use and maintenance of fibre ropes.

NOTE Recommendations on information for the use and maintenance of fibre ropes to be provided by the manufacturer are given in Annex C.

Annex A
(informative)

Typical characteristics of the yarns for man-made and natural fibres

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