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**Fibre ropes — High modulus  
polyethylene — 8-strand braided  
ropes, 12-strand braided ropes and  
covered ropes**

*Cordages en fibres — Polyéthylène à haut module — Cordages tressés  
à 8 torons, cordages tressés à 12 torons et cordages avec couverture*

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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.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see [www.iso.org/directives](http://www.iso.org/directives)).

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. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see [www.iso.org/patents](http://www.iso.org/patents)).

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

For an explanation on the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT) see the following URL: [www.iso.org/iso/foreword.html](http://www.iso.org/iso/foreword.html).

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

This second edition cancels and replaces the first edition (ISO 10325:2009), which has been technically revised. The main changes compared to the previous edition are as follows:

- Scope: a statement indicating that other commonly used types and grades of HMPE may be out of the coverage of this document has been added;
- Clause 3: the term “heat-set ropes” has been added;
- Table 1: the linear density and minimum breaking strength values has been modified.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at [www.iso.org/members.html](http://www.iso.org/members.html).

# Fibre ropes — High modulus polyethylene — 8-strand braided ropes, 12-strand braided ropes and covered ropes

## 1 Scope

This document specifies requirements for 8-strand braided ropes, for 12-strand braided ropes, and for covered rope constructions for general purpose made of high modulus polyethylene (HMPE), and gives rules for their designation.

Many different types and grades of HMPE fibre exist which are commonly used to produce rope products. This document does not cover all variations in strength or product performance. The rope manufacturer is consulted to ensure the intended design meets the requirements of the application.

## 2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements 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 1968, *Fibre ropes and cordage — Vocabulary*

ISO 2307, *Fibre ropes — Determination of certain physical and mechanical properties*

ISO 9554:2010, *Fibre ropes — General specifications*

## 3 Terms and definitions

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

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

- ISO Online browsing platform: available at <https://www.iso.org/obp>
- IEC Electropedia: available at <http://www.electropedia.org/>

### 3.1

#### **cover**

#### **jacket**

braided cover or other protective layer, which is placed over the rope core

Note 1 to entry: The cover has no significant contribution to the rope strength.

### 3.2

#### **heat-set rope**

rope with properties that have been modified by applying heat simultaneously with the addition of a controlled strained force

## 4 Designation fibre ropes

Fibre ropes shall be designated by the following:

- the words “fibre rope”;
- the number of this document, i.e. ISO 10325;

- the construction type of the rope;
- the reference number of the rope;
- the material from which the rope is made;
- the type of stabilization (type 1 or type 2).

HMPE ropes that have been heat set are designated as type 1 ropes. HMPE ropes that have not been heat set are designated as type 2 ropes.

EXAMPLE Designation of a 12-strand braided rope, reference number 20 (type T), corresponding to a linear density of 232 ktex made of high modulus polyethylene (HMPE) that has not been heat set:

**Fibre rope ISO 10325 - T - 20 - HMPE - 2**

## 5 Material

5.1 The ropes, or load bearing core of the rope, shall be made of continuous filament HMPE fibres.

5.2 Coating is typically applied to the rope for property enhancement purposes.

5.3 Concerning covered ropes, the cover may consist of a variety of fibre materials, for example, polyester, polyolefins, HMPE, and may be of varying thicknesses, depending on the requirements of the application. Core constructions may vary significantly also and include such designs as a single core or multiple cores. Consult the rope manufacturer to ensure the intended cover design meets the requirements of the application.

5.4 The typical characteristics of high modulus polyethylene fibre are indicated in ISO 9554:2010, Table A.1.

5.5 Heat setting may be done on HMPE ropes in order to increase the break strength per unit weight. A rope that has been heat set will have higher break strength for the same diameter as a non-heat-set rope, however the overall life time of the rope may be decreased. Consult the rope manufacturer to ensure the intended design meets the requirements of the application. Properties of heat-set ropes are not included in this document.

NOTE 1 Ropes constructed from 100 % HMPE fibres float. However, covered HMPE ropes can have a higher specific gravity and might sink.

NOTE 2 HMPE fibres have a low coefficient of friction and good abrasion resistance. The coefficient of friction can be altered by applying suitable coatings.

Different HMPE fibre grades may have different creep properties. If requested, the manufacturer shall provide information about creep properties.

## 6 General requirements

### 6.1 General

HMPE fibre ropes shall be made in one of the following constructions:

- type L: 8-strand braided ropes (see [Figure 1](#));
- type T: 12-strand braided ropes (see [Figure 2](#));
- type C: covered ropes [see [Figures 3 a\)](#) and [3 b\)](#)].

## 6.2 Construction, manufacture and lay length or braid pitch

**6.2.1** The construction, manufacture and braid pitch of 8-strand ropes and 12-strand ropes shall conform to ISO 9554.

**6.2.2** In the construction of covered ropes, the rope core is protected by a non-load-bearing cover. The construction, manufacture and lay length or braid pitch of the rope core or sub-ropes shall conform to ISO 9554.

NOTE The core or the sub-ropes can have various constructions.

**6.2.3** In the protective cover, strand interchanges, i.e. the overlapping continuation of an interrupted strand with another identical strand following the same path, are permitted if they are properly staggered.

## 6.3 Labelling, packaging, invoicing and delivered lengths

Labelling, packaging, invoicing and delivered lengths shall conform to ISO 9554.

## 7 Physical properties

For covered ropes, the diameter and linear density of the rope varies based on the cover material and thickness of the cover design selected. The values in [Table 2](#) reflect the strength of the load bearing core only. Consult the rope manufacturer for the actual diameter, linear density and strength values for specific cover design.

The linear density and minimum breaking strength shall conform to [Tables 1](#) and [2](#), which are indicative for general purpose ropes only. Various types of HMPE fibre are available with alternate performance characteristics and are outside of the scope of this document.

The user shall consider the performance requirements for the intended application before selecting a rope design and size.

## 8 Marking

The manufacturer may use coloured synthetic yarn(s) to identify its rope.

A printed marker tape shall be used in accordance with ISO 9554.

**Table 1 — Linear density and minimum breaking strength of 8-strand (type L) and 12-strand (type T) HMPE braided ropes**

Reference number <sup>a</sup>	Linear density <sup>b,c</sup>		Minimum breaking strength <sup>d,e</sup> kN		Reference number <sup>a</sup>	Linear density <sup>b,c</sup>		Minimum breaking strength <sup>d,e</sup> kN	
	Nominal ktex	Tolerance %	Un-spliced ropes	Ropes with eye-spliced terminations		Nominal ktex	Tolerance %	Un-spliced ropes	Ropes with eye-spliced terminations
6	23,0	±10 %	40	36	56	±5 %	2 330	2 095	
8	40,0		69	62	60		1 928	2 635	2 370
10	61,0	±8 %	105	95	64	±5 %	2 950	2 655	
12	87,0		150	135	68		2 453	3 285	2 955
14	117		200	180	72		2 738	3 635	3 270
16	152		255	230	76		3 038	4 000	3 600
18	190	±5 %	315	285	80	±5 %	4 375	3 940	
20	233		380	340	88		4 028	5 180	4 660
22	280		450	405	96		4 762	6 040	5 435
24	331		520	470	100		5 151	6 495	5 845
26	386		600	540	104		5 555	6 960	6 265
28	445		685	615	108		5 973	7 440	6 695
30	508		775	700	110		6 188	7 685	6 915
32	575		865	780	112		6 406	7 935	7 140
34	646		965	870	116		6 854	8 440	7 595
36	722		1 070	965	120		7 316	8 960	8 065
38	801		1 175	1 060	124		7 792	9 495	8 545
40	884		1 285	1 155	128		8 283	10 045	9 040
44	1 062		1 525	1 375	132		8 788	10 605	9 545
48	1 255		1 775	1 600	136		9 308	11 180	10 060
52	1 464		2 045	1 840	—		—	—	—

<sup>a</sup> The reference number corresponds to the approximate diameter, in millimetres.

<sup>b</sup> The linear density, in kilotex, corresponds to the net mass per length of the rope, expressed in grams per metre or in kilograms per kilometre.

<sup>c</sup> The linear density is obtained under reference tension and is measured as specified in ISO 2307.

<sup>d</sup> The breaking strengths relate to new, dry and wet ropes.

<sup>e</sup> A strength determined by the test methods specified in ISO 2307 is not necessarily an accurate indication of the force at which that rope might break in other circumstances and situations. The type and quality of terminations, the rate of force application, prior conditioning and previous force applications to the rope can significantly influence the breaking strength. A rope bent around a post, capstan, pulley or sheave might break at a significantly lower force. A knot or other distortion in a rope might significantly reduce the breaking strength.

Table 2 — Linear density and minimum breaking strength of covered HMPE ropes (type C)

Reference number <sup>a,f</sup>	Linear density <sup>b,c,f</sup>		Minimum breaking strength <sup>d,e</sup> kN	
	Nominal ktex	Tolerance %	Unspliced ropes	Ropes with eye- spliced terminations
20	240	±10	271	244
22	290		341	307
24	340		402	362
26	400		471	424
28	460		549	494
30	530		637	573
32	600		736	662
34	680		824	742
36	770		912	821
38	850		1 010	909
40	940		1 140	1 030
44	1 150		1 380	1 240
48	1 360		1 610	1 450
52	1 600		1 920	1 730
56	1 850		2 190	1 970
60	2 120		2 520	2 270
64	2 400		2 880	2 590
68	2 720		3 260	2 930
72	3 070		3 630	3 270
76	3 400		4 020	3 620
80	3 750	4 510	4 060	
88	4 500	5 350	4 820	
96	5 300	6 280	5 650	

<sup>a</sup> The reference number corresponds to the approximate rope diameter, in millimetres.

<sup>b</sup> The linear density, in kilotex, corresponds to the net mass per length of the rope, expressed in grams per metre or in kilograms per kilometre.

<sup>c</sup> The linear density is obtained under reference tension and is measured as specified in ISO 2307.

<sup>d</sup> The breaking strengths relate to new, dry and wet ropes.

<sup>e</sup> A strength determined by the test methods specified in ISO 2307 is not necessarily an accurate indication of the force at which that rope might break in other circumstances and situations. The type and quality of terminations, the rate of force application, prior conditioning and previous force applications to the rope can significantly influence the breaking strength. A rope bent around a post, capstan, pulley or sheave might break at a significantly lower force. A knot or other distortion in a rope might significantly reduce the breaking strength.

<sup>f</sup> See 5.3 and Clause 7 regarding the impact of covers on rope diameter and linear density.