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Fibre ropes — Polyamide — 3-, 4-, 8- and 12-strand ropes

Cordages en fibres — Polyamide — Cordages à 3, 4, 8 et 12 torons

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ISO copyright office
CP 401 • Ch. de Blandonnet 8
CH-1214 Vernier, Geneva
Phone: +41 22 749 01 11
Email: copyright@iso.org
Website: www.iso.org

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Foreword

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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).

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For an explanation of 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 www.iso.org/iso/foreword.html.

This document was prepared by Technical Committee ISO/TC 38, *Textiles*, in collaboration with the European Committee for Standardization (CEN) Technical Committee CEN/TC 248, *Textiles and textile products,* in accordance with the Agreement on technical cooperation between ISO and CEN (Vienna Agreement).

This fifth edition cancels and replaces the fourth edition (ISO 1140:2012), which has been technically revised.

The main changes compared to the previous edition are as follows:

— in the Scope, a statement specifying that the document does not cover all variations in strength or product performance has been added;

— in Clause 3, the term "minimum breaking strength" has been added;

— in Table 1, Table 2 and Table 3, the tolerances in linear density have 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.

Fibre ropes — Polyamide — 3-, 4-, 8- and 12-strand ropes

1 Scope

This document specifies requirements for 3-strand hawser-laid and 4-strand shroud-laid ropes, 8-strand braided ropes and 12-strand braided ropes for general service made of polyamide, and gives rules for their designation.

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 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 1968, *Fibre ropes and cordage — Vocabulary*

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

ISO 9554, *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
minimum breaking strength
MBS
force a fibre rope shall at least achieve when tested following a recognized procedure/test method

Note 1 to entry: The MBS is set by each manufacturer, as per their own internal statistical methods based on breaking tests. In ISO 9554:2019, Annex D, two statistical methods are given that can be used to determine the MBS.

[SOURCE: ISO 9554:2019, 3.2]

4 Designation

Fibre ropes shall be designated by

— the words “fibre rope”,

— the number of this document, i.e. ISO 1140,

— the construction or type of rope (see Clause 5),

— the reference number of the rope,

— the material from which the rope is made (the mixing of polyamide fibre types and grades shall not be permitted), and

— the type of stabilization (1 or 2 in accordance with ISO 9554).

Polyamide-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 other cases, polyamide-laid ropes that are not required to have a heat setting on the rope are designated as type 2 ropes.

EXAMPLE

Designation of a 3-strand hawser-laid rope heat set (type 1), reference number 20 (type A), corresponding to a linear density of 247 ktex and made of polyamide (PA):

Fibre rope ISO 1140 – A – 20 – PA – 1

5 General requirements

5.1 Polyamide ropes shall be made in one of the following constructions:

— type A: 3-strand hawser-laid rope (see Figure 1);

— type B: 4-strand shroud-laid rope (see Figure 2);

— type L: 8-strand braided rope (see Figure 3);

— type T: 12-strand braided rope (see Figure 4).

Figure 1 — Shape of a 3-strand hawser-laid rope (type A)

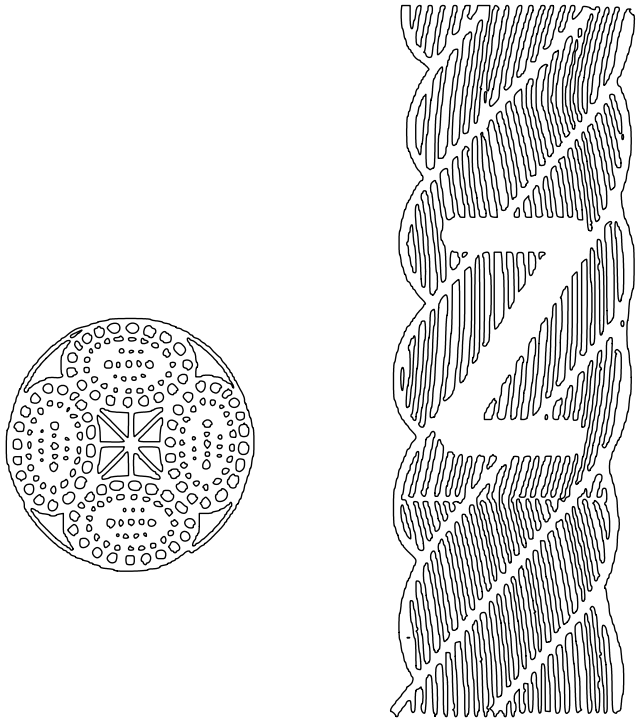

Figure 2 — Shape of a 4-strand shroud-laid rope (type B)

Figure 3 — Shape of an 8-strand braided rope (type L)

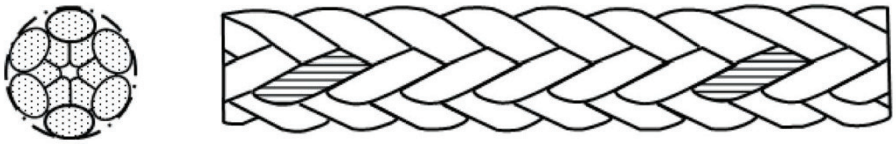

Figure 4 — Shape of a 12-strand braided rope (type T)

5.2 Construction, manufacture, lay, labelling, packaging, invoicing and delivery lengths shall be in accordance with ISO 9554.

6 Physical properties

Linear density and minimum breaking strength shall be in accordance with Table 1, Table 2 and Table 3.

Regarding Table 1, Table 2 and Table 3, the following applies.

— The reference number corresponds to the approximate diameter, in millimetres.

— The linear density, in kilotex, corresponds to the net mass per length of rope, expressed in grams per metre or in kilograms per thousand metres.

— The linear density is under reference tension and is measured as specified in ISO 2307.

— The breaking strengths quoted in these tables relate to new dry ropes. In wet conditions, the breaking strength will be lower.

— A force 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 the termination, 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 could break at a significantly lower force. A knot or other distortion in a rope will significantly reduce the breaking strength

Typically, the breaking strength of a new, wet rope is 10 % to 20 % lower than that of a new, dry rope tested under the same conditions. When testing the wet breaking strength of a rope it should be fully immersed in water for at least 24 h prior to the test and tested within one hour after removal from the water.

Table 1 — Linear density and minimum breaking strength (MBS) of 3-strand hawser-laid polyamide ropes, type A

Reference number	Linear density		Minimum breaking strength kN	
	Nominal ktex	Tolerance %	Unspliced ropes	Ropes with eye-spliced terminations
4	9,87	±10	3,75	3,38
4,5	12,5		4,50	4,05
5	15,4		5,60	5,04
6	22,2		8,00	7,20
8	39,5		14,0	12,6
9	50,0		17,0	15,3
10	61,7		21,2	19,1
12	88,8	±8	30,0	27,0
14	121		40,0	36,0
16	158		50,0	45,0
18	200		63,0	56,7
20	247		80,0	72,0
22	299		95,0	85,5
24	355		112	101
26	417		125	113
28	484		150	135
30	555		170	153
32	632		190	171
36	800		236	212

Table 1 *(continued)*

Reference number	Linear density		Minimum breaking strength kN	
	Nominal ktex	Tolerance %	Unspliced ropes	Ropes with eye-spliced terminations
40	987	±5	300	270
44	1 190		355	320
48	1 420		400	360
52	1 670		475	428
56	1 930		560	504
60	2 220		630	567
64	2 530		710	639
72	3 200		900	810
80	3 950		1 060	954
88	4 780		1 320	1 188
96	5 690		1 500	1 350
104	6 670		1 800	1 620
112	7 740		2 000	1 800
120	8 880		2 360	2 124
128	10 100		2 650	2 385
136	11 400		3 000	2 700
144	12 800		3 350	3 015
160	15 800		4 000	3 600

Table 2 — Linear density and minimum breaking strength (MBS) of 4-strand shroud-laid polyamide ropes, type B

Reference number	Linear density		Minimum breaking strength kN	
	Nominal ktex	Tolerance %	Unspliced ropes	Ropes with eye-spliced terminations
10	61,7	±10	19,0	17,1
12	88,8	±8	28,0	25,2
14	121		35,5	31,9
16	158		47,5	42,8
18	200		56,0	50,4
20	247		71,0	63,9
22	299		85,0	76,5
24	355		100	90,0
26	417		118	106
28	484		132	119
30	555		150	135
32	632		170	153
36	800		212	191
40	987	±5	265	239
44	1 190		315	284
48	1 420		375	338
52	1 670		425	383
56	1 930		500	450
60	2 220		560	504
64	2 530		630	567
72	3 200		800	720
80	3 950		950	855
88	4 780		1 180	1 062
96	5 690		1 400	1 260
104	6 670		1 600	1 440
112	7 740		1 900	1 710
120	8 880		2 120	1 908
128	10 100		2 360	2 124
136	11 400		2 650	2 385
144	12 800		3 000	2 700
160	15 800		3 550	3 195