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Fibre ropes for offshore stationkeeping —

Part 3: High modulus polyethylene (HMPE)

Cordages en fibres pour le maintien en position des structures marines —

Partie 3: Polyéthylène à haut module

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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).

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).

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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*.

This first edition of ISO 18692-3 cancels and replaces ISO/TS 14909:2012, which has been technically revised. The main changes compared to the previous edition are as follows:

— the document previously published as a Technical Specification has been reorganized as the new ISO 18692-3, taking into account the content of ISO 18692-1:2018.

A list of all parts in the ISO 18692 series can be found on the ISO website.

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 for offshore stationkeeping —

Part 3:
High modulus polyethylene (HMPE)

1 Scope

This document specifies the main characteristics and test methods of new high modulus polyethylene (HMPE) fibre ropes used for offshore stationkeeping.

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 18692-1:2018, *Fibre ropes for offshore stationkeeping — Part 1: General specification*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 1968 and ISO 18692-1 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/

4 Materials

The fibre used in the core of the rope shall be high-tenacity HMPE, with an average tenacity of not less than 2,5 N/tex, and qualified and tested in accordance with Annex A.

Rope cover material and other materials employed in rope assembly shall be in accordance with ISO 18692-1.

5 Requirements — Rope properties

5.1 Minimum breaking strength

The minimum breaking strength of the rope, when tested according to ISO 18692-1, shall conform to Table 1.

Table 1 — Minimum breaking strength (MBS)

Reference number[a]	Minimum breaking strength kN
63	2 500
71	3 200
80	4 000
90	5 000
100	6 300
106	7 100
112	8 000
118	9 000
125	10 000
132	11 200
140	12 500
150	14 000
160	16 000
170	18 000
180	20 000

[a] The reference number corresponds to the approximate outer diameter of the rope, in millimetres (mm). Actual diameters can vary for a given reference number.

5.2 Minimum core tenacity

The minimum tenacity of the rope core shall be 1,3 N/tex, measured according to ISO 18692-1.

All samples tested shall comply with this minimum value.

5.3 Creep properties

The rope creep properties shall be at least as declared by the manufacturer, when tested following the method in Annex B.

5.4 Torque properties

Torque-neutral rope or torque-matched rope shall be defined according to ISO 18692-1.

5.5 Cyclic loading performance

The rope shall have demonstrated performance under cycling loading following the requirements of ISO 18692-1.

5.6 Particle ingress protection

Unless otherwise specified, the rope shall be constructed with a protection of the core against the ingress of particles in accordance with ISO 18692-1.

6 Requirements — Rope layout and construction

Rope layout and construction shall be in accordance with ISO 18692-1.

7 Rope testing

7.1 Type test

7.1.1 General

Type tests shall be performed in accordance with ISO 18692-1 and the specific requirements of this clause.

7.1.2 Sampling

The number of rope samples to be tested is given in Table 2.

Table 2 — Number of samples for testing

Test	Number of samples
Breaking strength, core tenacity and stiffness[c]	3
Creep	1[a]
Torque properties[a]	1
Linear density	1
Cyclic loading endurance[b]	1

[a] See ISO 18692-1:2018, 7.1.4.

[b] See ISO 18692-1:2018, 7.1.6.

[c] See also ISO 18692-1:2018, B.3.5.4.

7.1.3 Breaking strength tests, core tenacity, and stiffness tests

The number of samples from Table 2 shall be tested, and each sample shall be capable of meeting the requirements of 5.1 and of 5.2.

NOTE The measurements of the dynamic stiffness at end of bedding-in — and, when required, those of the quasi-static stiffness and the dynamic stiffness at several mean load level — are performed for design purposes only. There are no acceptance criteria on these parameters.

7.1.4 Creep properties test

One sample shall be tested for creep properties in accordance with the test method in Annex B.

This test needs not be performed where data are available from the previous qualification test of another rope (or a sub-rope of it) with the same design, material and method of manufacture of rope core, and a size not less than reference number 71.

7.1.5 Linear density test

The linear density shall be calculated from the measured weight and length according to the method defined in ISO 18692-1:2018, Annex B.

7.1.6 Cyclic loading endurance test

The cyclic loading endurance test shall be performed according to the procedure specified in ISO 18692-1.

The residual strength of the rope shall be not less than 80 % of the MBS.

7.1.7 Protective cover thickness

The thickness of the protective cover shall be verified. See ISO 18692-1:2018, 7.1.7.

7.1.8 Particle ingress protection

See 5.6 and ISO 18692-1:2018, Annex B.

7.2 Testing of current production

Testing of current production shall be in accordance with ISO 18692-1.

8 Report

The report shall be in accordance with ISO 18692-1.

9 Certification

Certification shall be in accordance with ISO 18692-1.

10 Marking, labelling and packaging

The marking, labelling and packaging shall be in accordance with ISO 18692-1.

Annex A
(normative)

Fibre qualification and testing

A.1 General

Fibre qualification and testing shall be in accordance with ISO 18692-1:2018, Annex A, except provisions related to marine finish and yarn-on-yarn abrasion performance, and the following requirements that are related to the creep properties of HMPE fibres.

NOTE High modulus polyethylene (HMPE) is considered intrinsically marine graded and no "marine finish" is used.

A.2 Creep properties

In addition to data in ISO 18692-1:2018, A.2.3, the following information (extracted from a documented model of fibre creep properties based on test results) shall be made available by the fibre manufacturer to the rope manufacturer, covering:

a) creep rate (per cent divided by time unit) and allowable extension (%) (or allowable creep time), under a range of specific stresses (N/tex) and temperatures, to cover those expected in operation;

b) creep rate (per cent divided by time unit) under the tension [and corresponding specific stress (N/tex)] and at the temperature (°C) during rope creep test in accordance with Annex B;

c) creep rate in the conditions of fibre testing during production.

NOTE 1 The "creep rate" in this subclause refers to the creep rate in the so-called "steady state creep" regime (see Annex C and Reference [2]).

NOTE 2 Data of creep properties are used by the rope manufacturer (or by the purchaser) to evaluate the creep allowable life time of the rope (see Annex C).

A.3 Fibre specification — Physical and mechanical properties

The following information shall be provided in the fibre specification, in addition to those in ISO 18692-1:2018, A.2.3:

a) elongation (%) in a reference condition, i.e. specified tension (specific stress in N/tex), temperature (°C) and time (h).

These properties shall be documented by results of tests in accordance with A.5.

A.4 Fibre certificate

The following information shall be provided in the material certificate, in addition to those in ISO 18692-1:2018, A.3:

a) creep test.

For acceptance testing, the above property shall be obtained from testing on a representative number of samples taken from the delivery, not less than once every 10 000 kg.