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Textile slings — Lifting slings for general purpose lifting operations made from fibre ropes — High modulus polyethylene (HMPE)

Élingues textiles — Élingues de levage pour opérations de levage pour usage général en cordages en fibres — Polyéthylène à haut module (HMPE)

Reference number
ISO 18264:2022(E)

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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

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).

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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 second edition cancels and replaces the first edition (ISO 18264:2016), which has been technically revised.

The main changes are as follows:

— the Scope has been made more concise;

— the Normative references have been updated; some references have been moved to the Bibliography;

— the Terms and definitions have been updated;

— the formulae in Table 4 have been corrected;

— figures and designations have been changed in accordance with ISO/IEC Directives Part 2:2021;

— subclauses 7.3.2 and 7.3.3 have been rewritten and simplified. References are given to ISO 2377and ISO 9554 instead of repeating the texts in those standards.

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.

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Introduction

This document has been prepared to be a standard providing one means of complying with the essential safety requirements.

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Textile slings — Lifting slings for general purpose lifting operations made from fibre ropes — High modulus polyethylene (HMPE)

1 Scope

This document specifies the requirements related to safety, including methods of rating and testing sling constructions made from fibre ropes. It is applicable to ropes made of high modulus polyethylene (HMPE) fibre having a minimum reference number of 12 and a maximum reference number of 72.

The fibre rope slings covered by this document are intended for general-purpose lifting operations only, i.e. when used for lifting objects, materials or goods which require no deviations from the requirements, design factors, or work load limits specified.

This document does not cover slings used for the lifting of persons, potentially dangerous materials such as molten metal and acids, glass sheets, fissile materials, nuclear reactors and special (non-routine and engineered) lifting operations. This document can be used as a reference for lifting slings made with HMPE fibres to be used in special lifting operations.

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 2262, *General purpose thimbles for use with steel wire ropes — Specification*

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

ISO 2415, *Forged shackles for general lifting purposes — Dee shackles and bow shackles*

ISO 7500-1, *Metallic materials — Calibration and verification of static uniaxial testing machines — Part 1: Tension/compression testing machines — Calibration and verification of the force-measuring system*

ISO 7597, *Forged steel lifting hooks with latch, grade 8*

ISO 8539, *Forged steel lifting components for use with Grade 8 chain*

ISO 9554:2019, *Fibre ropes — General specifications*

ISO 10325, *Fibre ropes — High modulus polyethylene — 8-strand braided ropes, 12-strand braided ropes and covered ropes*

ISO 12100:2010, *Safety of machinery — General principles for design — Risk assessment and risk reduction*

ISO 16798, *Links of Grade 8 for use with slings*

3 Terms and definitions

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

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

— ISO Online browsing platform: available at https://www.iso.org/obp

— IEC Electropedia: available at https://www.electropedia.org/

3.1
abrasion
mechanical wearing of a surface resulting from frictional contact with other materials and objects

3.2
angle of choke
α_{CH}
angle formed in a sling body as it passes through the choking eye or fittings

Note 1 to entry: See 3.9, Figure 1 and Figure 4.

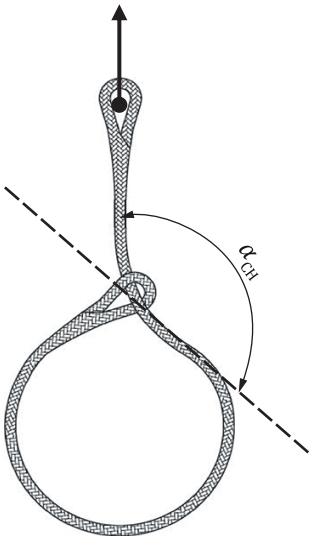
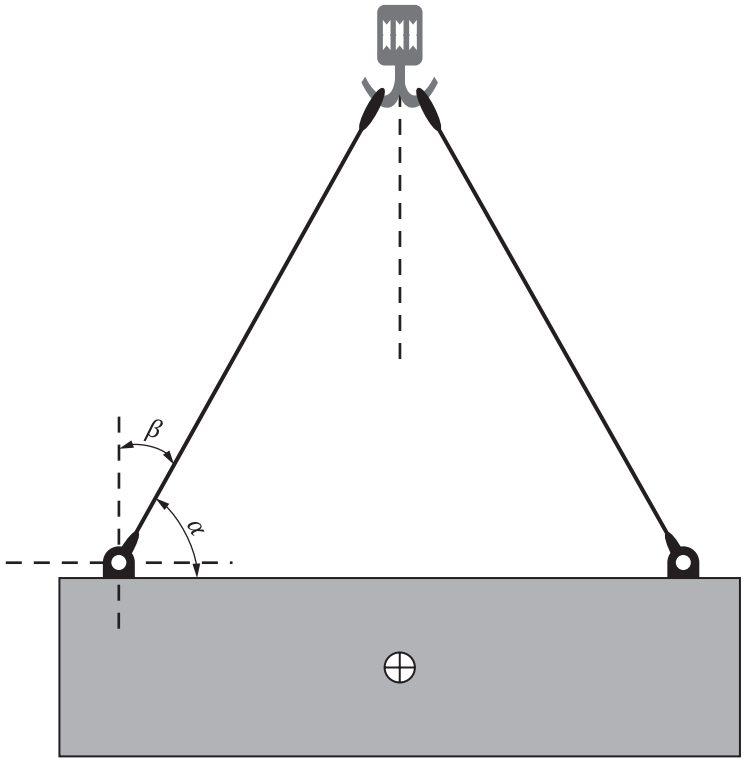


Figure 1 — Example of angle of choke

3.3
angle of loading
α
horizontal angle

Note 1 to entry: β vertical angle. See Figure 2.

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Key

β vertical angle

α horizontal angle

Figure 2 — Example of angle of loading

3.4
competent person
designated person, suitably trained and qualified by knowledge and practical experience, and with the necessary instructions to enable the required tests and operations as well as examinations to be carried out

3.5
design factor
factor by which the nominal breaking strength of *sling construction* (3.25) is divided to determine its working load limit in straight pull

Note 1 to entry: Also referred to as safety factor (SF).

Note 2 to entry: This term has the same meaning as the term "working coefficient" used in the EU Machinery Directive.

Note 3 to entry: Fittings may have different design factors from that of the fibre ropes to which they are connected.

3.6
effective work length
EWL
actual finished length of the fibre rope sling construction, inclusive fittings, from bearing point to bearing point while being loaded to a reference load to be determined and documented by the manufacturer

Note 1 to entry: See *nominal length* (3.19) as well as Figure 6 and Figure 7.

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3.7
general-purpose lifting operation
operation identified and described as the one which[8] is a repetitive lift covered by a previously prepared JRA and LP, carried out by lifting team trained in the use of specific lifting operation/device and competent to complete the entire operation

Note 1 to entry: Also referred to as routine lifts or lifting operation, and is the opposite of special (non-routine or engineered) lifting operation.

3.8
basket hitch
method of rigging a sling in which the sling is passed around the load and both loop eyes and end fittings are attached to the lifting device

Note 1 to entry: See Figure 3.

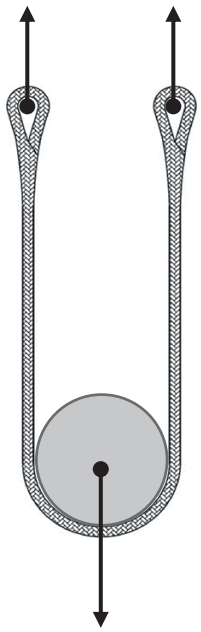


Figure 3 — Example of basket hitch

3.9
choker hitch
method of rigging a sling in which the sling is passed around the load, then through one loop eye, end fitting, or other piece of hardware, with the other loop eye or end fitting attached to the lifting device

Note 1 to entry: This *hitch* (3.10) can be done with a sliding choker hook or similar device (see Figure 4).

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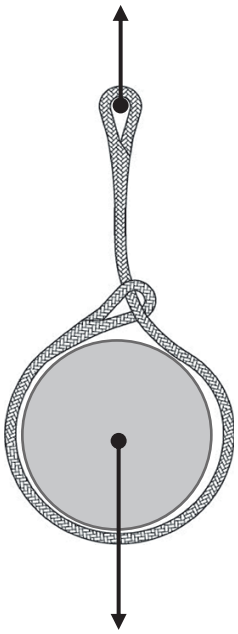


Figure 4 — Example of choker hitch

3.10
hitch
method of rigging (attaching) one or several slings temporarily to a load, or object, for the purpose of lifting

3.11
vertical hitch
method of rigging a sling in which the load is attached to the loop eye or end fitting at one end of the sling and the loop eye or end fitting at the other end is attached to the lifting device

Note 1 to entry: Any *hitch* (3.10) less than 5° from the vertical (β in Figure 2) may be considered a vertical hitch (see Figure 5).



Figure 5 — Example of vertical hitch

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3.12
intermediate master link
link used to connect one or two legs of a sling to a *master link* (3.16)

Note 1 to entry: Intermediate links can be assembled with a master link to form a permanent master link.

3.13
job risk assessment
JRA
process where

— health and safety hazards are identified,

— risks associated with the hazards are analysed and evaluated, and

— appropriate ways to eliminate or control these hazards are determined

Note 1 to entry: In practical terms, a risk assessment is a thorough look at your workplace to identify those things, situations, processes, etc. that can cause harm, particularly to people. After identification is made, the user of the slings evaluates how likely and severe the risk is, and then decides what measures should be in place to effectively prevent or control the harm from happening. The result of this process is documented by the user of the slings in the form of a job risk assessment (JRA).

3.14
lifting configuration
arrangement characterized by the number of sling legs in the lifting assembly, the *angle of loading* (3.3) under which they spread and in which the sling assembly is connecting the suspended load and the lifting mechanism

Note 1 to entry: The lifting configuration is characterized by the number of sling legs in the lifting assembly, the angle of loading under which they spread and in which the sling assembly is connected to the suspended load. As part of the arrangement additional hardware, such as e.g. (intermediate) master links, shackles and spreader bars may be used".

3.15
lift plan
LP
documented plan of the proposed lifting operation

Note 1 to entry: Lift plan covers aspects such as the following:

— characterization of the load in terms of dimensions, weight and centre of gravity;

— characterization of the task in terms of lifting, rotation, speeds and travel directions;

— evaluation of the hazards to determine consequences resulting from collision, upset or dropping of the suspended load;

— determination of how to rig the load using good rigging practices and ensuring the use of proper rigging techniques during the lift;

— ensuring that the attachment points and suspended load can withstand the forces created by the rigging gear attachment;

— selecting equipment and rigging based on the type, category of lift and minimum capacity of lifting equipment (hoist, crane, slings, lifting fixture, etc.) and on the identified load, task and hazards;

— ensuring that sling angles are considered when determining forces on rigging equipment and the suspended load.

3.16
master link
link forming the upper terminal of a sling or *intermediate master link* (3.12) by means of which the sling is attached to the hook of a crane or other lifting device

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3.17
multi-leg sling
sling assembly (3.23) composed of multiple (two, three or four) legs with the top ends gathered in a master link that goes over the lifting hook

Note 1 to entry: Also called bridle sling.

Note 2 to entry: Examples are given in Figures 9 to 11.

Note 3 to entry: Sling legs in one assembly may not necessarily have an equal EWL and/or R_F. In the case where EWL and/or R_F are not identical, such deviations need to be covered by the LP.

3.18
nominal diameter
d
specified diameter of the rope which is usually used as the reference number for a given product

3.19
nominal length
L_0
specified length of the sling leg, inclusive of fittings, from bearing point to bearing point

Note 1 to entry: See Figures 6 and 7.

3.20
proof force
F_p
force applied as a test to a finished *sling construction* (3.25), as specified in *proof test* (3.21)

Note 1 to entry: Also referred to as "proof load"

3.21
proof test
non-destructive force (or load) test made to a predefined *proof force* (3.20) (or load) of a *sling construction* (3.25)

3.22
rated force
R_F
maximum allowable force of a *sling construction* (3.25)

Note 1 to entry: Also referred to as rated load and expressed in kN.

3.23
sling assembly
one or more sling leg(s)/*sling constructions* (3.25) combined with rigging hardware (such as links, shackles, thimbles) to be used as part of a rigging arrangement for the purpose of lifting a load

3.24
sling body
fibre rope used as load bearing part to create a *sling assembly* (3.23)

3.25
sling construction
eye-and-eye (see Figure 6) or endless construction (see Figure 7) of a fibre rope used to create a *sling assembly* (3.23)

Note 1 to entry: Also referred to as sling leg.

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3.26
sling manufacturer
person or company assembling or fabricating sling components into their final form

Note 1 to entry: The rope and sling manufacturer are not necessarily identical entities.

3.27
soft eye
eye made by forming the end of the fibre rope into a loop and by splicing the free end to the standing part

3.28
special lifting operations
lifting operations where [12]

— *job risk assessment (JRA)* (3.13) is required to identify and mitigate the risks and a completed *lift plan (LP)* (3.15) is required, and

— new specific lift plan (LP) is required based on a risk assessment

Note 1 to entry: Also referred to as non-routine lifts or engineered lifting operations.

3.29
splice

3.29.1
spliced eye
loop, or eye, formed in the end of a rope

3.29.2
cut splice
connection of two ends to create an endless connection by tucking the ends of the strands back into the main body of the fibre rope in a prescribed manner

3.30
working load limit of the lifting configuration
WLL
maximum allowable total suspended mass a *lifting configuration* (3.14) is authorized to sustain in *general-purpose lifting operations* (3.7)

4 Hazards

The accidental release of a suspended load or release of a suspended load due to failure of a component puts at risk, either directly or indirectly, the safety or health of those persons within the danger zone. In order to provide the necessary strength, durability and reliability of lifting accessories, this document specifies requirements for the design, manufacture, testing, use and maintenance of the slings to ensure the specified levels of performance are met.

Endurance/durability has not been identified as a risk when properly designed manufactured and tested fibre rope slings, comprising high tenacity HMPE fibre, having the specified levels of performance, given in this document, are properly used and inspected for general-purpose lifting operations.

Since failure can be caused by overloading or incorrect selection of the working load limit (WLL) and specification of lifting accessory, this document also gives the requirements for marking and the manufacturer's certificate.

Aspects of selection and safe and reliable use associated with good practice are given in Annex A and Annex B.

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