INTERNATIONAL STANDARD

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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 **iTeh ST**module (HMPE) **D PREVIEW**

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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 on 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.

The committee responsible for this document is ISO/TC 38, *Textiles*.

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Introduction

This International Standard 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 International Standard specifies the requirements related to safety, including methods of rating and testing eye-and-eye and endless sling constructions used as single (1) leg, two (2) leg, three (3) leg or four (4) leg lifting configurations (with and without fittings). These sling constructions are made of 8-strand braided ropes (type L), 12-strand braided ropes (type T), covered rope constructions (type C) according to ISO 10325. Alternatively, other laid and braided rope constructions deviating from ISO 10325, but tested according to ISO 2307, may be used. This International Standard is applicable to rope constructions made of High Modulus Polyethylene [HMPE, also referred to as Ultra High Molecular Weight Polyethylene (UHMWPE)] fibre having a minimum reference number of 12 and a maximum reference number of 72, even though there is no direct link between rope reference numbers and the type of lifting operations, either general-purpose or special lifting operations.

Parts of the braided load bearing constructions in such slings, or the whole sling, can be enclosed in a protective cover/jacket/sleeve. The protective cover/jacket/sleeve is designed to be non-load bearing as it is intended only for protection and containment of the load bearing core.

The fibre rope slings covered by this International Standard 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, safety factors, also referred to as design factors, or work load limits specified.

Lifting operations hot covered by this international Standard would include the lifting of persons, potentially dangerous materials such as molten metal and acids, glass sheets, fissile materials, nuclear reactors and special lifting operations.

This International Standard deals with the technical requirements to minimize the hazards listed in <u>Clause 4</u> which can arise during the use of fibre rope slings when carried out in accordance with the instructions and specification given by the manufacturer, its authorized representative or qualified and/or competent person.

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. 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 2076, Textiles — Man-made fibres — Generic names

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 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 12480-1, Cranes — Safe use — Part 1: General

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.

3.1

abnormal operating conditions

environmental conditions that are unfavourable, harmful or detrimental to or for the operation of sling assemblies, such as excessively high ambient temperature, exposure to chemicals, dust laden atmospheres and hazardous locations

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3.2

abrasion

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

3.3

angle of choke

α_{CHOKE} (standards.iteh.ai) angle formed in a sling body as it passes through the choking eye or fittings

Note 1 to entry: See Figure 1 and Figure 4. https://standards.iteh.ai/catalog/standards/sist/fbff24d6-49e7-4036-8a52-40b3814ccd5e/iso-18264-2016



Key

1 α_{CHOKE}

Figure 1 — Example of angle of choke

3.4 **angle of loading** horizontal angle α angle formed by the sling leg with the horizontal line Note 1 to entry: See Figure 2.



Key

- β vertical angle
- α angle of loading

Figure 2 — Example of angle of loading

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3.5 IICH STAND

competent person (standards, iteh, ai) designated person, suitably trained and qualified by knowledge and practical experience, and with the necessary instructions to enable the required tests and examination to be carried out ISO 18264:2016

3.6 https://standards.iteh.ai/catalog/standards/sist/fbff24d6-49e7-4036-8a52design factor DF

ratio of the maximum load and the rated load of the *sling construction* (3.26)

Note 1 to entry: Also referred to as safety factor (SF) as defined in ISO 1968.

Note 2 to entry: Fittings may have different design factors from that of the fibre rope to which they are connected.

Note 3 to entry: This term has the same meaning as the term "working coefficient" or "safety factor" used in the EU Machinery Directive

3.7 effective work length EWL

L_{EW}

actual finished length of the fibre rope sling construction, inclusive of fittings, from bearing point to bearing point

Note 1 to entry: See *nominal length* (3.20).

3.8

general-purpose lifting operation

operation also referred to as routine lifts or lifting operation and, as opposed to special lifting operation, can be identified and described as the one which^[6]

- is covered by a *job risk assessment* (JRA) (3.14),
- may not require a new *lift plan* (LP) (<u>3.16</u>),

- is operation/lift for which a lift plan (LP) can be generic, but should still be reviewed prior to the operation,
- is known, repetitive operation/lift, familiar to the qualified and/or *competent person* (3.5) or lifting team,
- is repetitive lift which is covered by a previously prepared JRA and LP, however, this should be reviewed by a qualified and/or competent person,
- is where the identified lifting team is trained in the use of the specific lifting equipment/devices and familiar with its opportunities and limitations and competent to complete the entire operation,
- is where qualified and/or competent person or lifting team has performed their roles previously,
- is where all personnel involved is familiar with the written JRA and LP for the operation being conducted, and
- is where the LP is verified as the current issue before the operation

3.9

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

3.10 choker hitch

method rigging a sling in which the sling passed around the load, then through one loop eye, end fitting, or other device, with the other loop eye or end fitting attached to the lifting device

Note 1 to entry: This *hitch* (3.11) can be done with a sliding choker hook or similar device (see Figure 4).



Figure 4 — Example of choker hitch

3.11

hitch

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

3.12

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* (3.11) 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

3.13 intermediate master link

link used to connect one or two legs of a sling to a *master link* (3.17)

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

3.14 job risk assessment JRA process where

- health and safety hazards are identified,
- the risks associated with the hazards are analyzed 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 may 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).

3.15

lifting configuration

special condition (lifting mode) to which a *sling assembly* (3.24) is subject when being attached simultaneously to a suspended load and to a 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 (3.4) under which they spread and in which the sling assembly is connected to the suspended load. As part of the rigging arrangement additional hardware, such as, e.g. (intermediate) master links, shackles and spreader bars, may be used.

3.16 lift plan LP

documented plan of the proposed lifting operation covering aspects such as the following:

- characterization the load in terms of dimensions, weight and center 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 the suspended load; https://standards.iteh.ai/catalog/standards/sist/fbff24d6-49e7-4036-8a52-40b3814ccd5e/iso-18264-2016
- 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

3.17

master link

link forming the upper terminal of a sling or *intermediate master link* (3.13) by means of which the sling is attached to the hook of a crane or other lifting machine

3.18

multi-leg sling

sling assembly (3.24) composed of multiple (two, three or four) and identical legs with the top ends gathered in a fitting that goes over the lifting hook

Note 1 to entry: Also called bridle sling.

EXAMPLE Examples are given in Figures 9 to 11.

3.19

nominal diameter

 $d_{\rm ROPE}$

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

3.20

nominal length

 L_0

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

Note 1 to entry: See <u>Figures 6</u> and <u>7</u>.

3.21

proof force

Fp

force applied as a test to a finished *sling construction* (<u>3.26</u>), as specified in *proof test* (<u>3.22</u>)

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

3.22

proof test

rated force

non-destructive force (or load) test made to a predefined *proof force* (3.21) (or load) of a *sling construction* (3.26)

3.23

 $F_{\rm R}$

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maximum allowable tension of a *sling construction* (3.26)

Note 1 to entry: Also referred to as rated load.

ISO 18264:2016 Note 2 to entry: Expressed in kNrds.iteh.ai/catalog/standards/sist/fbff24d6-49e7-4036-8a52-

40b3814ccd5e/iso-18264-2016

3.24

sling assembly

one or more sling leg(s)/*sling constructions* (3.26) combined with rigging hardware (such as, e.g. links, shackles, thimbles) to be used as part of a rigging arrangement for the purpose of lifting a load

3.25

sling body

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

3.26

sling construction

eye-and-eye (see Figure 6) or endless construction (see Figure 7) of a fibre rope used to create a *sling assembly* (3.24)

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

3.27

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.

3.28

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.