

AS 18264:2022



STANDARDS
Australia



Textile slings — Lifting slings for general purpose lifting operations made from fibre ropes — High modulus polyethylene (HMPE) (ISO 18264:2016 MOD)



AS 18264:2022

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- Australian Diecasting Association
- Australian Industry Group
- Australian Maritime Safety Authority
- Better Regulation Division (Fair Trading, Safework NSW, Testsafe)
- Chamber of Commerce and Industry Queensland
- Department of Defence (Australian Government)
- Department of Regional NSW
- Engineers Australia
- Hire and Rental Industry Association of Australia
- Lifting Equipment Engineers Association
- National Association of Testing Authorities Australia
- The Crane Industry Council of Australia
- Victorian WorkCover Authority (WorkSafe Victoria)

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Preface

This Standard was prepared by the Standards Australia Committee ME-025, Lifting Tackle, to supersede AS 1380.1:1999, *Fibre-rope slings, Part 1: Product specification* and AS 1380.2:1999, *Fibre-rope slings, Part 2: Care and use*.

The objective of this document is to specify 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), and 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 document 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 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, safety factors, also referred to as design factors, or work load limits specified.

Lifting operations not covered by this document 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 document deals with the technical requirements to minimize the hazards listed in Clause 4 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.

This Standard is an adoption with national modifications, and has been reproduced from, ISO 18264:2016, *Textile slings — Lifting slings for general purpose lifting operations made from fibre ropes — High modulus polyethylene (HMPE)*. The modifications are additional requirements and are set out in [Appendix ZZ](#), which has been added at the end of the source text.

[Appendix ZZ](#) lists the variations to ISO 18264:2016 for the application of this Standard in Australia.

As this document has been reproduced from an International Standard, the following applies:

- (a) In the source text “this International Standard” should read “this document”.
- (b) A full point substitutes for a comma when referring to a decimal marker.

Australian or Australian/New Zealand Standards that are identical adoptions of international normative references may be used interchangeably. Refer to the online catalogue for information on specific Standards.

The terms “normative” and “informative” are used in Standards to define the application of the appendices or annexes to which they apply. A “normative” appendix or annex is an integral part of a Standard, whereas an “informative” appendix or annex is only for information and guidance.

Contents

Preface	ii
Foreword	v
Introduction	vi
1 Scope	1
2 Normative references	1
3 Terms and definitions	2
4 Hazards	8
5 Sling materials and components	9
5.1 Fibre ropes	9
5.2 Coatings	10
5.3 Cover (sleeves, jackets)	10
5.4 Mechanical components	10
5.5 Other materials and components	10
6 Sling constructions, fabrication and lifting configurations	10
6.1 Sling constructions	10
6.2 Fabrication	11
6.2.1 Splicing	11
6.2.2 Considerations for connecting hardware and fittings	12
6.2.3 Other requirements for mechanical components	13
6.3 Lifting configurations	13
6.4 Design factor	14
6.5 Working load limit	15
6.5.1 Calculation of the working load limit of a lifting configuration (WLL_{LC})	15
6.5.2 Calculation of the working load limit of a lifting configuration (WLL_{LC}) as a consequence of bending losses	17
6.6 Effective work length	18
6.7 Traceability code	18
7 Sling verification	18
7.1 General	18
7.2 Qualification of personnel	19
7.3 Type test for verification of sling constructions	19
7.3.1 General	19
7.3.2 Methodology	19
7.3.3 Basic procedure for type testing/verification of MBF	20
7.3.4 Extended procedure for type testing/verification of MBF	21
7.3.5 Type test to verify the interaction of a sling construction with fittings	22
7.4 Manufacturing tests	22
7.4.1 Visual examination	22
7.4.2 Determination of the effective work length of sling legs	22
7.4.3 Proof testing requirements	22
7.4.4 Breaking force tests	23
7.5 Type and manufacturing testing in case of modifications to sling constructions	23
7.6 Visual examination	24
8 Sling marking	24
8.1 General	24
8.2 Labelling	24
8.2.1 Information	24
8.2.2 Label colour	25
9 Manufacturer's certificate	25
10 Instructions for selection, use, inspection and maintenance	25

Annex A	(normative) Instructions for selection, use, inspection and maintenance to be provided by the sling manufacturer or its authorized representative with the HMPE fibre rope slings	26
Annex B	(informative) Suggested content of information to be provided by the manufacturer or its authorized representative with the HMPE fibre rope sling assembly	28
Bibliography		34
Appendix ZZ	(normative) Variations to ISO 18264:2016 for Australia	35

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).

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).

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 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*.

Introduction

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

Australian Standard®

Textile slings — Lifting slings for general purpose lifting operations made from fibre ropes — High modulus polyethylene (HMPE) (ISO 18264:2016 MOD)

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 not 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 [Clause 4](#) 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

3.2

abrasion

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

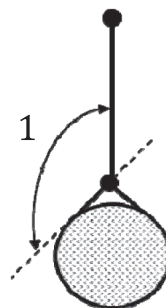
3.3

angle of choke

α_{CHOKE}

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](#).



Key

1 α_{CHOKE}

Figure 1 — Example of angle of choke

3.4

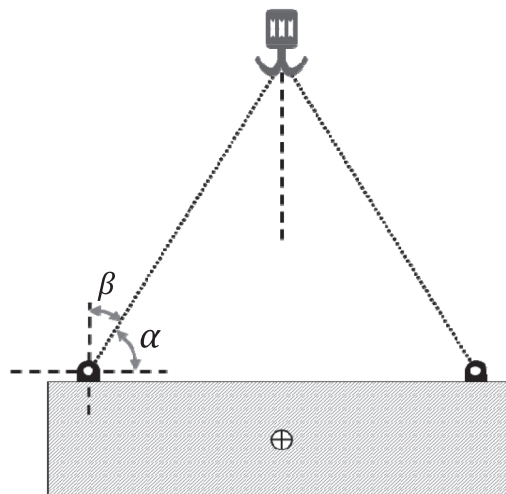
angle of loading

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**3.5****competent person**

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

3.6**design 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) ([3.16](#)),

- 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](#).

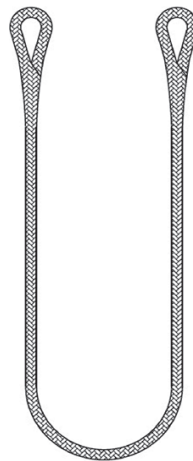


Figure 3 — Example of basket hitch

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](#)).

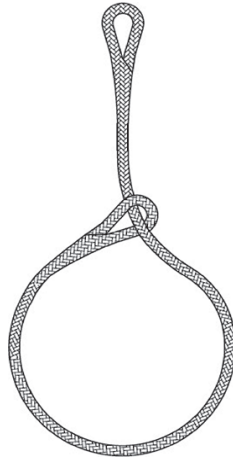


Figure 4 — Example of choker hitch

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;
- 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_{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 [Figures 6](#) and [7](#).

3.21**proof force** F_p

force applied as a test to a finished *sling construction* ([3.26](#)), as specified in *proof test* ([3.22](#))

Note 1 to entry: Also referred to as “proof load”.

3.22**proof test**

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

3.23**rated force** F_R

maximum allowable tension of a *sling construction* ([3.26](#))

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

Note 2 to entry: Expressed in kN.

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.

3.29

special lifting operations

operations which do not meet all criteria for *general-purpose lifting operations* (3.8) and are lifting operations where^[10]

- a *job risk assessment* (JRA) (3.14) is required to identify and mitigate the risks and a completed *lift plan* (LP) (3.16) is required, and
- a 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.

3.30

splice

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

3.31

working load limit of the lifting configuration

WLL_{LC}

maximum allowable total suspended mass a *lifting configuration* (3.15) is authorized to sustain in *general-purpose lifting operations* (3.8)

Note 1 to entry: Expressed in t.

4 Hazards

The accident 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 and durability of lifting accessories, this International Standard specifies requirements for the design, manufacture, testing, use and maintenance to ensure the specified levels of performance are met.

Endurance/durability has not been identified as a risk when properly designed and manufactured fibre rope slings, comprising high tenacity HMPE fibre, having the specified levels of performance, given in this International Standard, 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 International Standard also gives the requirements for marking and the manufacturer's certificate.

Aspects of selection and safe use associated with good practice are given in [Annex A](#) and [Annex B](#).

[Table 1](#) lists those hazards, as derived from ISO 12100:2010, in so far as they are dealt with in this International Standard that require action to reduce those hazards identified as being specific and significant for fibre rope slings made of HMPE fibre rope.

It is known that HMPE fibres are susceptible to creep, like most synthetic fibres, that under certain conditions can lead to creep rupture. Under constant loading HMPE fibres and ropes show an irreversible deformation (creep) behaviour that is strongly dependent upon load and temperature, as well as the type of HMPE fibre.^[10] Different HMPE fibres display different creep behaviour under identical conditions.

Depending on the conditions the slings are intended to be used, the sling user shall consult the sling manufacturer in order to select the appropriate design.

Table 1 — Type or group of hazards and associated hazard mitigation requirements

Type or group of hazards and relevant subclause(s) of ISO 12100:2010; derived from Table B.1	Examples of hazards		Hazard mitigation requirements in relevant (sub)clause(s) of this International Standard
	a) Origin	b) Potential consequences	
Mechanical hazards: 6.1, 6.2.1, 6.2.2.1, 6.2.2.2, 6.2.3 a) and b), 6.2.6, 6.3.1, 6.3.2, 6.3.3, 6.3.4.3, 6.3.5.5, 6.4.1, 6.4.2, 6.4.3, 6.4.4, 6.4.5	Human error/behaviour, education and training, documentation, planning, cutting parts, falling objects, instability, rough surfaces, sharp edges, shock loading, incorrect or missing sling marking, handling, ...	Being run over, crushing, cutting, abrasion, puncture, tilting, overloading, falling, ...	5, 6, 7, 8, 9, 10, Annexes A and B.
Thermal hazards: 6.1, 6.2.2.2, 6.2.3, 6.2.6, 6.3.2.1, 6.3.4.5, 6.4.5.1 a), b), d) and e)	Human error/behaviour, education and training, documentation, planning, radiation of heat sources, vibration, ...	Melting, burn, falling, ...	Annex B
Hazards associated with the environment in which the machine is used: 6.1, 6.2.6, 6.3.2.1, 6.4.5.1 a) and b)	Human error/behaviour, education and training, documentation, planning, dust, pollution, chemical components, temperature, handling, ...	Cutting, abrasion, puncture, falling, ...	4, 5, 9, 10, Annex B
Combination of hazards: All the above	Combination of origins mentioned above	Combination of consequences mentioned above	5, 6, 7, 8, 9, 10, Annexes A and B
a A single origin of a hazard can have several potential consequences.			
b For each type of hazard or group of hazards, some potential consequences can be related to several origins of hazard.			

5 Sling materials and components

5.1 Fibre ropes

Fibre rope materials covered by this International Standard for the use of sling assemblies are a High Modulus Polyethylene (HMPE) fibres as defined in ISO 2076.

The HMPE rope constructions covered by this International Standard are the following:

- 8-strand braided ropes (type L), 12-strand braided ropes (type T) and covered rope constructions (type C) manufactured and tested in accordance with ISO 2307 and ISO 10325;
- laid and braided rope constructions deviating from ISO 10325, manufactured and tested in accordance with ISO 2307.