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English Version

Textile slings - Safety - Part 1: Flat woven webbing slings made of man-made fibres for general purpose use

Elingues textiles - Sécurité - Partie 1: Elingues plates en sangles tissées en textiles chimiques d'usage courant

Textile Anschlagmittel - Sicherheit - Teil 1: Flachgewebte Hebebänder aus Chemiefasern für allgemeine Verwendungszwecke

This European Standard was approved by CEN on 25 June 2000 and includes Corrigendum 1 issued by CEN on 7 June 2006 and Amendment 1 approved by CEN 11 September 2008.

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EUROPEAN COMMITTEE FOR STANDARDIZATION
COMITÉ EUROPÉEN DE NORMALISATION
EUROPÄISCHES KOMITEE FÜR NORMUNG

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Foreword

This document (EN 1492-1:2000+A1:2008) has been prepared by Technical Committee CEN/TC 168 “Chains, ropes, webbing, slings and accessories - Safety”, the secretariat of which is held by BSI.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by May 2009, and conflicting national standards shall be withdrawn at the latest by December 2009.

This document supersedes EN 1492-1:2000.

This document includes Amendment 1, approved by CEN on 2008-09-11 and Corrigendum 1 issued by CEN on 2006-06-07.

The start and finish of text introduced or altered by amendment is indicated in the text by tags [A1] ⟨A1⟩.

The modifications of the related CEN Corrigendum have been implemented at the appropriate places in the text and are indicated by the tags [AC] ⟨AC⟩.

This European Standard has been prepared under a mandate given to CEN by the European Commission and the European Free Trade Association, and supports essential requirements of EU Directive(s).

[A1] For relationship with EU Directive(s), see informative Annexes ZA and ZB, which are integral parts of this document. ⟨A1⟩

This European Standard is one of a series of standards related to safety for textile slings as listed below:

Part 1: Specification for flat woven webbing slings, made of man-made fibres, for general purpose use

Part 2: Specification for roundslings, made of man-made fibres, for general purpose use

Part 4: Specification for lifting slings for general service made from natural and man-made fibre rope

In this standard:

Annex A is normative, and gives the test methods to be used to verify the safety requirements.

Annex B is normative, and gives the requirements for information on use and maintenance to be provided by the manufacturer with flat woven webbing slings conforming to this European Standard.

Annex C is informative, and gives guidance for the conduct of type tests in accordance with annex A.

Annex D is informative, and provides some detailed information for use and maintenance which may be appropriate in compiling the information in accordance with annex B.

[A1] Annexes ZA and ZB are informative and give ⟨A1] the relationship with EU Directives.

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Bulgaria, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland and United Kingdom.

Introduction

This European Standard has been prepared to be a harmonized standard providing one means of complying with the essential safety requirements of the Machinery Directive and associated EFTA regulations.

This European Standard is a type C standard as specified in EN 292. The lifting accessories concerned and the extent to which hazards are covered is indicated in the scope of this standard.

NOTE For hazards that are not covered by this standard, lifting accessories should be in accordance with EN 292.

1 Scope

This European Standard specifies the requirements related to safety, including methods of rating and testing single-, two-, three-, four-leg and endless sewn flat woven webbing slings, with or without fittings, made of polyamide, polyester and polypropylene man-made fibre webbing in the width range of 25 mm to 450 mm inclusive.

The flat woven webbing slings covered by this Part of EN 1492 are intended for general purpose lifting operations, i.e. when used for lifting objects, materials or goods which require no deviations from the requirements, safety factors or working load limits specified. Lifting operations not covered by this standard would include the lifting of persons, potentially dangerous materials such as molten metal and acids, glass sheets, fissile materials, nuclear reactors and where special conditions apply.

Flat woven webbing slings conforming to this European Standard are suitable for use and storage in the following temperature ranges:

a) polyester and polyamide -40°C to 100°C,

b) polypropylene -40°C to 80°C

This European Standard does not apply to the types of webbing sling indicated below:

a) slings such as bag slings, nets (consisting of several crossed webbings stitched together), ‘adjustable’ slings (containing, for example, intermediate buckles stitched along the webbing), etc.;

b) slings made from webbing woven from monofilament yarns;

c) slings designed for pre-slinging and intended not to be re-used;

This European Standard deals with the technical requirements to minimize the hazards listed in clause 4 which can arise during the use of flat woven webbing slings when carried out in accordance with the instructions and specifications given by the manufacturer or authorized representative.

2 Normative references

This European Standard incorporates by dated or undated reference, provisions from other publications. These normative references are cited at the appropriate places in the text and the publications are listed hereafter. For dated references, subsequent amendments to or revisions of any of these publications apply to this European standard only when incorporated in it by amendment or revision. For undated references the latest edition of the publication referred to applies (including amendments).

EN 292-2:1991/A1:1995, Safety of machinery - Basic concepts, general principles for design - Part 2: Technical principles and specifications

EN 1050:1996, Safety of machinery - Principles of risk assessment

prEN 1677-1:2000, Components for slings – Safety – Part 1: Forged steel components, Grade 8

prEN 1677-2:2000, Components for slings – Safety – Part 2: Forged steel lifting hooks with latch, Grade 8

prEN 1677-3:1998, Components for slings – Safety – Part 3: Forged steel self-locking hooks, Grade 8

prEN 1677-4:1998, Components for slings – Safety – Part 4: Links, Grade 8

prEN 1677-5:1998, Components for slings – Safety – Part 5: Forged steel lifting hooks with latch, Grade 4

prEN 1677-6:1998, Components for slings – Safety – Part 6: Links, Grade 4

EN 10002-2: 1991, Metallic materials - Tensile testing –- Part 2: Verification of the force measuring system of the tensile testing machines

EN 45012, General requirements for bodies operating assessment and certification/registration of quality systems (ISO/IEC Guide 62:1996)

EN ISO 5084:1996, Textiles - Determination of thickness of textiles and textile products (ISO 5084:1996)

EN ISO 9002, Quality systems - Model for quality assurance in production, installation and servicing (ISO 9002:1994)

3 Terms and definitions

For the purposes of this standard, the following terms, definitions, symbols and abbreviations apply.

3.1
flat woven webbing sling
flexible sling consisting of a sewn webbing component, with or without fittings (see table 2), for attaching loads to the hook of a crane or other lifting machine.

3.2
multi-layer sling
flat woven webbing sling, the sewn webbing component or components of which consist of two or more layers of identical webbings superimposed in the lengthwise direction (See table 2).

3.3
multi-leg sling assembly
flat woven webbing sling assembly, consisting of two, three or four identical flat woven webbing slings attached to a master link (See table 3).

3.4
representative sling/representative sewn webbing component
flat woven webbing sling, or the sewn webbing component of a flat woven webbing sling, representative of each type or construction of sling, which is used for verification purposes (See 6.2. and 6.3).
NOTE This may differ from the production sling/sewn webbing component in length only

3.5
seam
method of securing the webbing to itself, securing several webbings to each other, or securing reinforcements to the webbing by means of stitches produced by the thread traversing the layers.

3.6
closed surface
webbing surface which, when visually and manually examined, appears closed, as is the case following thermofixing or colouring with additional substances, and where the single fibres support each other.

3.7
eye
termination of a sewn webbing component, produced by turning the end of the webbing through 180° and securing it to the standing part of the webbing by a loadbearing seam, so forming a terminal soft eye or attaching a terminal fitting.

3.8
soft eye
terminal eye of a sewn webbing component so formed as to allow reeving, the attachment of removable fittings or connection to the hook of a crane, other lifting machine or lifting accessory.

3.9
fitting
loadbearing metal component, supplied as part of a sling and which is used to terminate the sling so as to allow it to be reeved, attached to other lifting accessories, connected to other flat woven webbing slings to form a multi-leg sling assembly or connected to the hook of a crane or other lifting machine.

3.10
master link
link, or link assembly, forming the upper terminal fitting of a multi-leg sling assembly by means of which the sling assembly is attached to the hook of a crane, other lifting machine or lifting accessory.

3.11
nominal length
specified length of the sling, inclusive of fittings, from bearing point to bearing point (See table 1).

3.12
effective working length (EWL)
actual finished length of the flat woven webbing sling, inclusive of fittings, from bearing point to bearing point (See 5.7).

3.13
working load limit (WLL)
maximum mass which the sewn webbing component of a flat woven webbing sling is designed to sustain in straight pull and which a sling or sling assembly is authorized to sustain in general lifting service (See table 3).

3.14
mode factor (M)
factor applied to the WLL of a flat woven webbing sling in order to arrive at the WLL of a sling or sling assembly for a given mode of assembly or use.

3.15
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.
NOTE 4.18 of EN ISO 9002:1994 gives guidance on training.

4 Hazards

The accidental release of a load, or release of a 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 Part of EN 1492 specifies requirements for the design, manufacture and testing to ensure the specified levels of performance are met.

Endurance has not been identified as a hazard when flat woven webbing slings having the specified levels of performance given in this Part of EN 1492 are used in general lifting service.

Since failure can be caused by the incorrect choice of WLL and specification of lifting accessory this Part of EN 1492 also gives the requirements for marking and the manufacturer's certificate.

Aspects of safe use associated with good practice are given in annex B (normative) and annex D (informative).

Table 1 lists those hazards in so far as they are dealt with in this standard that require action to reduce those risks identified by risk assessment as being specific and significant for flat woven webbing slings made of polyamide, polyester and polypropylene .

Table 1 — Hazards and associated requirements

Hazards identified in annex A of EN 1050:1996		Relevant clause of annex A of EN 292-2: 1991/A1: 1995	Relevant clause/subclause of this Part of EN 1492
1.e)	Mechanical hazard due to inadequacy of strength	1.3.2	5
		4.1.2.3	5
		4.1.2.5	5
		4.2.4	6
		1.7.3	7
		4.3.2	7
		4.2.4	8
15	Errors of fitting hazard	1.5.4	5
17	Falling or ejected objects hazard	1.3.3	Annex B
26	Insufficient instructions for the driver/operator	1.7.4	9, annex B
		4.4.1	9, annex B
27.1.5	Inadequate holding devices/accessories hazard	4.4.1	5.14
27.6	Inadequate selection of lifting accessories hazard	4.1.2.5	5.14 and 6
		4.3.2	7

5 Safety requirements

5.1 Materials

The webbing shall be woven wholly from industrial yarns and certified by the manufacturer as being fast to light and heat-stabilized with a tenacity of not less than 60 cN/tex, from one of the following materials:

— polyamide (PA), high tenacity multifilament;

— polyester (PES), high tenacity multifilament;

— polypropylene (PP), high tenacity multifilament.

NOTE The definitions for these are given in ISO 2076. The content of the constituent materials may be determined in accordance with ISO 1833.

NOTE Attention is drawn to the different resistance of man-made fibres to chemicals, which are summarized in annex D.

5.2 Weaving

All yarns shall be of identical parent material (see 5.1).

Whether it is conventional or shuttleless woven, the webbing shall be woven with multiple piles, uniformly woven and the edges such that when one of the yarns breaks during weaving the ends cannot be pulled from the webbing causing it to unpick.

The method of weaving shall be such that the width of the finished sling changes by no more than -10 % for widths less than or equal to 100 mm, and -12% for widths over 100 mm, when a sample is tested in accordance with annex A.

5.3 Width

The width of the woven webbing, b (see figure 1), shall not be less than 25 mm and shall not exceed 450 mm and when measured with a steel tape or rule graduated in increments of 1 mm, shall have the following tolerances:

a) ± 10 % for nominal widths less than or equal to 100 mm;

b) ± 8 % for nominal widths greater than 100 mm.

5.4 Webbing thickness and sling thickness

For single layer flat woven webbing slings, the loadbearing element of the sling shall have a minimum thickness of 2 mm exclusive of any finishes or cast-on features. For multi-layer slings, the webbing used to provide each layer of the loadbearing element of the sling shall have a minimum thickness of 1,2 mm.

The thickness, s_1 (see figure 1), shall be measured in accordance with ISO 5084.

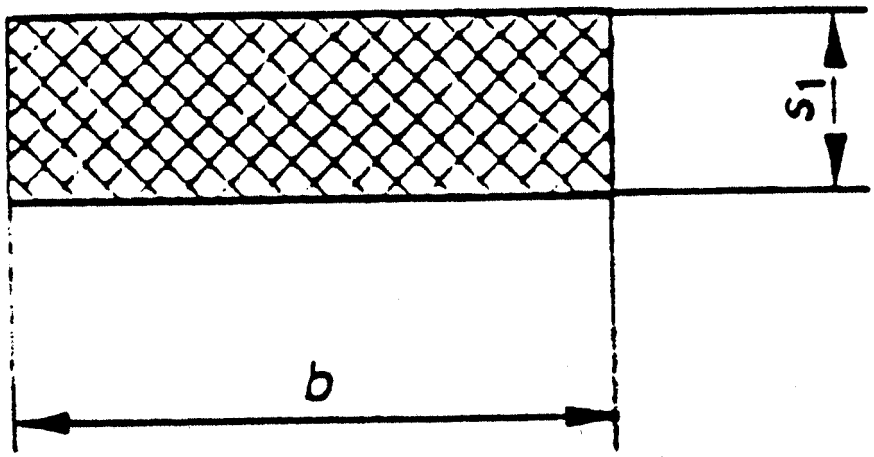


Figure 1 — Webbing width and thickness

5.5 Finishing and other treatments

The webbing forming the sewn webbing component shall be coloured (see 5.11).

The sewn webbing component shall be treated to produce a closed surface.

NOTE These treatments inhibit abrasion and the ingress of abrasive materials and may be applied to the webbing and/or the sewn webbing component and/or the yarn.

5.6 Sling types and designation

Endless flat woven webbing slings, type A, shall be made from 1 or 2 webbing layers. Single flat woven webbing slings with soft eyes, type B, and single flat woven webbing slings with metal fittings, type C, and/or reevable fittings, type Cr, shall be made from 1, 2, 3 or 4 layers. The designation shall give the type letter and number of layers, e.g. A2 (see table 2).

5.7 Effective working length (EWL)

The effective working length (EWL), l_1, of a flat woven webbing sling (see table 2) shall not differ from the nominal length by more than 3 % of the nominal length, when laid flat and measured with a steel tape or rule graduated in increments of 1 mm.

5.8 Sewing of slings

5.8.1 All seams shall be made from thread of identical parent material (see 5.1) as the webbing and shall be made with a locking stitch machine.

Stitches shall not touch or affect the edges of the webbing except those which secure the eye durability reinforcement.

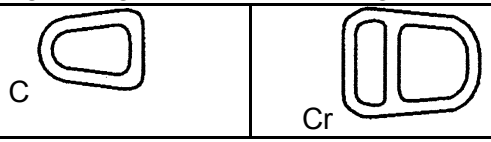
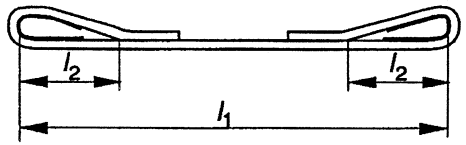
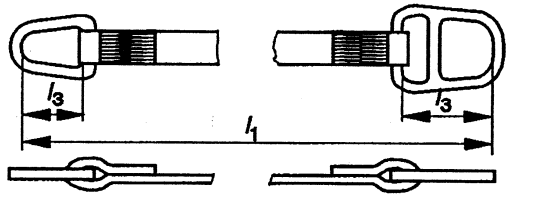
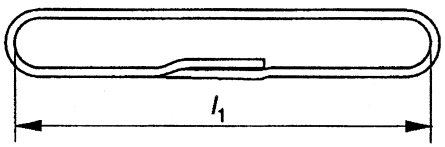
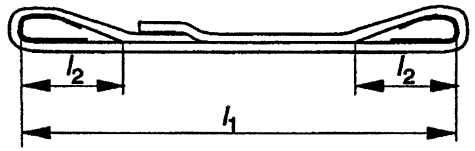
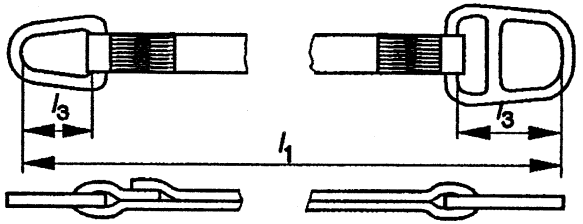
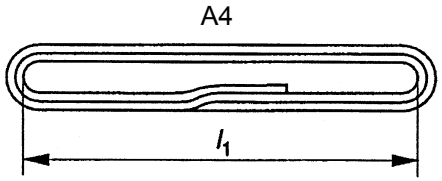
NOTE The use of a different colour thread to that of the rest of the sling will facilitate inspection during the manufacturer's verification and in-service inspections by the user

5.8.2 The stitches of the seam shall traverse the parts of the webbing to be sewn together, and the stitching shall lay flat and not have loops above the surface of the webbing.

5.8.3 The ends of cut webbing shall be treated in such a way (e.g. fused by heating) as to prevent unravelling. Treatment of cut ends by heating shall not damage adjacent stitching, and heat-treated ends shall not be oversewn.

NOTE Where the webbing has been impregnated to prevent thread slippage, further treatment is not necessary, in which case the ends may be oversewn.

Table 2 — Summary and type designation of main types of flat woven webbing slings

Form	A - endless	B - single sling with reinforced eyes	C - single sling with fittings Cr - single sling with reevable fittings
Load bearing webbing parts			
Single load bearing part		single layer sling with reinforced eyes B1 	single layer sling with fittings C1 Cr1 
Two load bearing parts	single layer sling A2 	two layer sling with reinforced eyes B2 	two layer sling with fittings C2 Cr2 
Four load bearing parts	two layer sling A4 		

NOTE The table of sling types illustrated is not exhaustive

5.9 Soft eyes

The inside length, l_2, of the eyes (see table 2), when measured flat using a steel tape or rule graduated in increments of 1 mm, shall be of the following minimum dimensions:

a) Three times the width of the webbing for width of up to 150 mm;

b) Two and a half times the width of the webbing for widths greater than 150 mm.

NOTE The preferred types of soft eye formation are illustrated in figure 2.

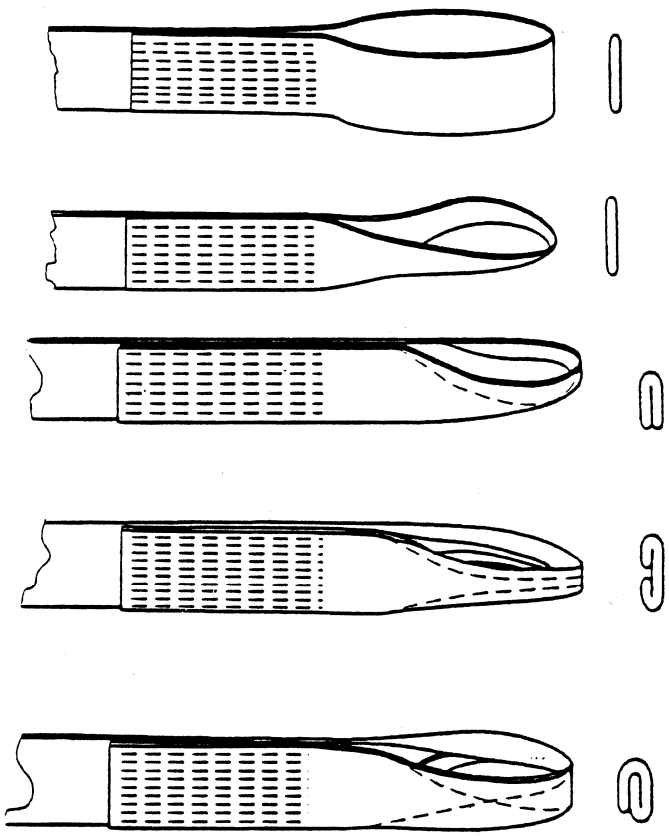
1) Flat eye

2) Reversed eye

3) Folded eye ½ width from one side

4) Folded eye ½ width from two sides

5) Folded eye 1/3 width



NOTE Folded eyes are produced by folding the parts of the webbing that form the eye onto each other to narrow the profile of engagement. The two edges are sewn together or to the webbing itself.

NOTE Folded eyes may also be reversed

NOTE The eye types illustrated are not exhaustive.

NOTE For reasons of clarity, eye reinforcement has been omitted from the illustrations, it is however a requirement of this standard that soft eyes are reinforced (see 5.10)

Figure 2 — Preferred soft eye types

5.10 Reinforcement of soft eyes

Soft eyes shall be reinforced to protect the inner surface of the eye against damage during lifting and at the point of choking in a choked lift.

NOTE Examples of suitable reinforcing material are a sleeve or piece of webbing or leather or other durable material.

5.11 Colour coding

The colour code of the sewn webbing component shall be as given in table 3 to indicate its WLL. Sewn webbing components of any other nominal working load limits, not indicated in table 3, shall not be denoted with the colours indicated therein.

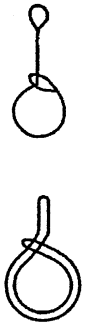
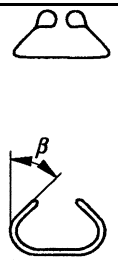
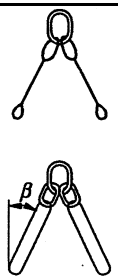
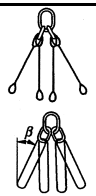
5.12 Working load limits

The WLL of a flat woven webbing sling, or sling assembly, shall be derived from the WLL of the sewn webbing component multiplied by the appropriate mode factor, M, in accordance with table 3.

5.13 Failure force

The minimum failure force for the sewn webbing component shall be such that it will sustain a force equivalent to 7 times the WLL when tested in accordance with annex A. It shall not be pre-loaded prior to testing, unless all sewn webbing components of the same type are subjected to identical pre-loading.

Table 3 — Working load limits and colour codes

WLL of sewn webbing component	Colour of sewn webbing component	Working load limits in tonnes								
		Straight lift	Choked lift	Basket hitch			Two leg sling		Three and four leg slings	
										
				Parallel	β = 0 to 45°	β = 45°to 60°	β = 0 to 45°	β = 45° to 60°	β = 0 to 45°	β = 45° to 60°
		M = 1	M = 0,8	M = 2	M = 1,4	M = 1	M = 1,4	M = 1	M = 2,1	M = 1,5
1,0	Violet	1,0	0,8	2,0	1,4	1,0	1,4	1,0	2,1	1,5
2,0	Green	2,0	1,6	4,0	2,8	2,0	2,8	2,0	4,2	3,0
3,0	Yellow	3,0	2,4	6,0	4,2	3,0	4,2	3,0	6,3	4,5
4,0	Grey	4,0	3,2	8,0	5,6	4,0	5,6	4,0	8,4	6,0
5,0	Red	5,0	4,0	10,0	7,0	5,0	7,0	5,0	10,5	7,5
6,0	Brown	6,0	4,8	12,0	8,4	6,0	8,4	6,0	12,6	9,0
8,0	Blue	8,0	6,4	16,0	11,2	8,0	11,2	8,0	16,8	12,0
10,0	Orange	10,0	8,0	20,0	14,0	10,0	14,0	10,0	21	15,0
Over 10,0	Orange									
M = Mode factor for symmetrical loading. Handling tolerance for slings or parts of slings indicated as vertical = 6°										

5.14 Fittings supplied as part of a sling

5.14.1 Fittings shall conform to the appropriate part or parts of prEN 1677:2000 (for parts 1 and 2) and of prEN 1677:1998 (for parts 3, 4, 5 and 6).

5.14.2 The seating of a fitting in contact with the webbing shall be so finished that, when tested in accordance with annex A:

a) there shall be no damage to the area of webbing in contact with the fitting;

b) the sling shall sustain the load.

5.14.3 Welded fittings shall be placed so that the welds remain visible when the sling is in use.

5.15 Reinforcements and protection against damage from edges and/or abrasion

5.15.1 Durability reinforcement, where provided, shall be cast onto the webbing, or in the form of a piece of reinforcing material or sleeve which shall be sown to the webbing.

5.15.2 Protective sleeves, where provided, shall be of tubular form such that they are free to enable them to be positioned over the part of the sewn webbing component which is to be protected.

NOTE Examples of suitable reinforcing and protection materials are webbing, woven fabric, leather or other durable material.

5.16 Traceability code

The traceability code, which is to be included in the marking (see 7.1), shall enable at least the following basic elements of the manufacturing record to be traced:

a) identification of webbing;

b) identification of manufacturer’s control;

c) identification and grade of fittings.

6 Verification of safety requirements

6.1 Qualification of personnel

All testing and examination shall be carried out by a competent person.

6.2 Type tests

6.2.1 The first representative sling of each type or construction, including change of material, shall be tested to verify the WLL. The test shall be in accordance with A.3.

If, during testing, the sewn webbing component does not sustain a force equivalent to seven times the WLL, but sustains a load of not less than 90% of this force, three further samples of the same type shall be tested. If one or more of these samples does not sustain a force equivalent to seven times the WLL, slings of this type shall be deemed not to comply with this standard.

6.2.2 A representative sewn webbing component of each type intended for use with fittings, sling types C/Cr, shall be tested to verify the interaction of the sewn webbing component with fittings. The test shall be in accordance with A.4

If, during testing, the sewn webbing component fails to sustain a force equivalent to 5 times its WLL, but sustains a load of not less than 90% of this force, three further samples of the same type shall be tested. If one or more of these samples does not sustain a force equivalent to 5 times the WLL of the sewn webbing component, slings of this type shall be deemed not to comply with this standard.

6.3 Manufacturing test regime

6.3.1 General

The manufacturing test regime shall depend on whether the manufacturer has a quality system conforming to EN ISO 9002, certified by a certification body accredited to EN 45012.

NOTE A quality system conforming to EN ISO 9001 automatically conforms to EN ISO 9002.

If such a system is in place and operating, the manufacturer's test regime shall comply with 6.3.2. If no such system is in place or operating, the manufacturer's test regime shall comply with 6.3.3.

6.3.2 Manufacturing test when quality system conforming to ISO 9002 is in place

If a quality system conforming to EN ISO 9002 is in place, during the manufacture, slings shall be selected for testing at least at the intervals given in table 4 or every 2 years, whichever is the sooner. The selected slings shall be tested to verify the WLL in accordance with A.3.

Table 4 — Maximum testing intervals

WLL of sewn webbing component	Maximum quantity per type between tests
Up to and including 3 t	1000
Over 3 t	500

If, during testing, the sewn webbing component does not sustain a force equivalent to seven times the WLL, but sustains a load of not less than 90 % of this force, three further samples shall be tested. If one or more of these samples does not sustain a force equivalent to seven times the WLL, slings of this type shall be deemed not to comply with this standard.

6.3.3 Manufacturing test when quality system conforming to EN ISO 9002 is not in place

If a quality system conforming to EN ISO 9002 is not in place, during the manufacture, slings shall be selected for testing at least at the intervals given in table 5 or every 12 months, whichever is the sooner. The selected slings shall be tested to verify the WLL in accordance with A.3.

Table 5 — Maximum testing intervals

WLL of sewn webbing component	Maximum quantity per type between tests
Up to and including 3 t	500
Over 3 t	250

If, during testing, the sewn webbing component does not sustain a force equivalent to seven times the WLL, but sustains a load of not less than 90% of this force, three further samples shall be tested. If one or more of these samples does not sustain a force equivalent to seven times the WLL, slings of this type shall be deemed not to comply with this standard.

6.4 Visual and manual examination

Each completed sling or sling assembly shall be visually and manually examined including measurement of the principal dimensions. If any non-compliance with the safety requirements or if any defect is found, the sling shall be rejected.

6.5 Test and examination records

The manufacturer shall retain a record of the results of all tests and examinations for inspection and reference purposes.

7 Marking

7.1 General

The marking of the sling shall include at least the following:

a) the working load limit, in straight lift;

b) the material of the webbing, i.e. polyester, polyamide, polypropylene;

c) grade of fitting;

d) the nominal length in m;

e) the manufacturer's name, symbol, trade mark or other unambiguous identification ⟨A1⟩ and, where applicable, the name and address of the authorized representative ⟨A1⟩;

f) the traceability code (see 5.16);

g) the number and relevant Part of this European Standard.

NOTE Marking this European Standard number on or in relation to a product represents a manufacturer's declaration of conformity, i.e. a claim by or on behalf of the manufacturer that the product meets the requirements of the standard. Such a declaration is not to be confused with third-party certification of conformity.

7.2 Sling types A, B, C and Cr

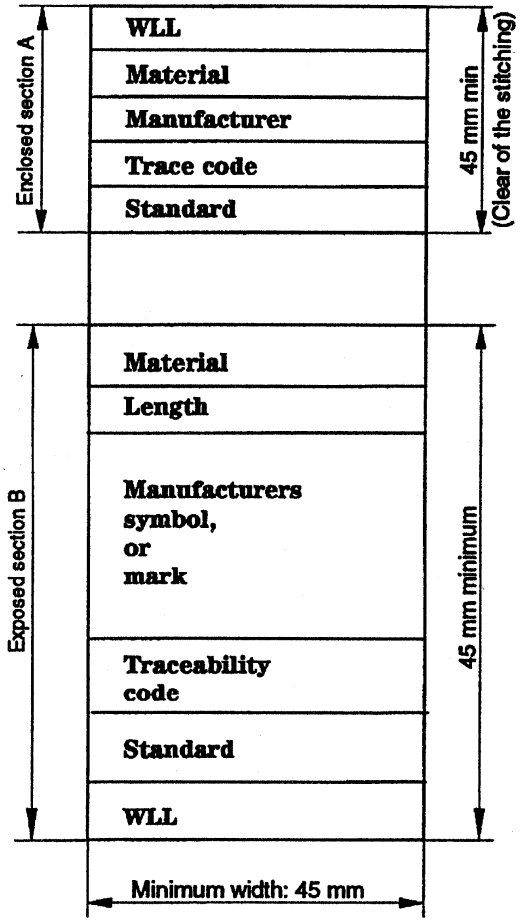
7.2.1 The information shall be marked (in accordance with 7.1) both legibly and indelibly, on a durable label fixed directly onto the webbing. It shall be marked in a type size of not less than 1,5 mm in height. A section of the label shall be enclosed under the stitching which shall also be marked with this information for reference purposes. A typical label is shown in figure 3 and figures 4, 5 and 6 show typical methods of the attachment of labels to the various sling types.

7.2.2 The material from which the webbing is made shall be identified by the colour of the label itself on which the information is marked. The following label colours shall be used:

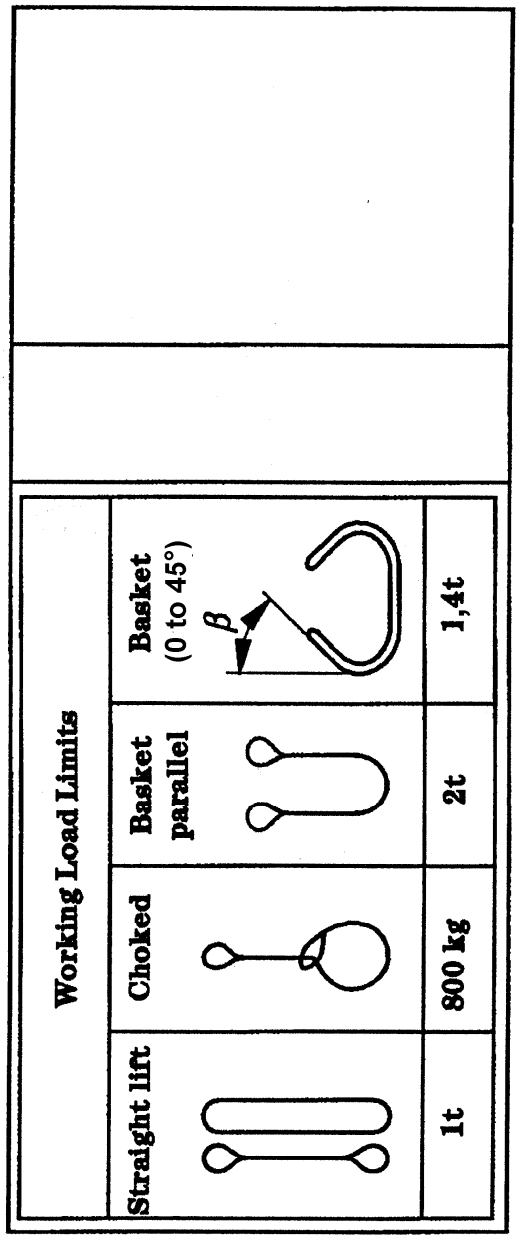
— Polyamide green

— Polyester blue

— Polypropylene brown



[AC] a) Front [AC]



[AC] b) Reverse (optional) [AC]

Figure 3 — Typical label format

NOTE The reverse side of the exposed part of the label may additionally be marked with the WLLs of the sling in various modes of use [AC] (see Figure 3 b)) [AC].

NOTE Typical methods for label attachment are shown in figures 4 to 6.

NOTE The legal marking (CE for the EU) can be marked at any visible place on the label.

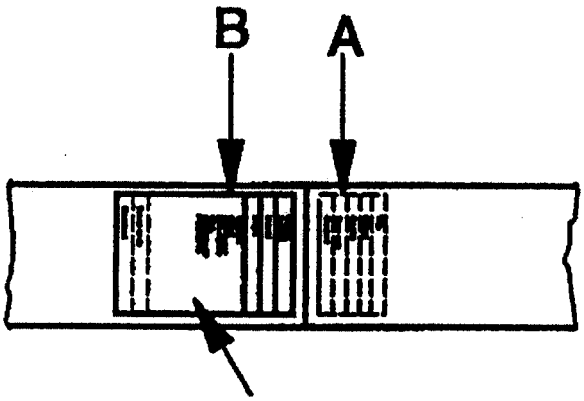


Figure 4 — Typical attachment of label on an endless sling

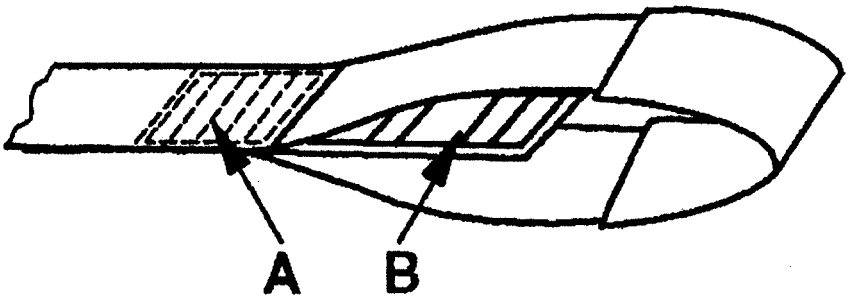


Figure 5 — Typical attachment of label on a single sling

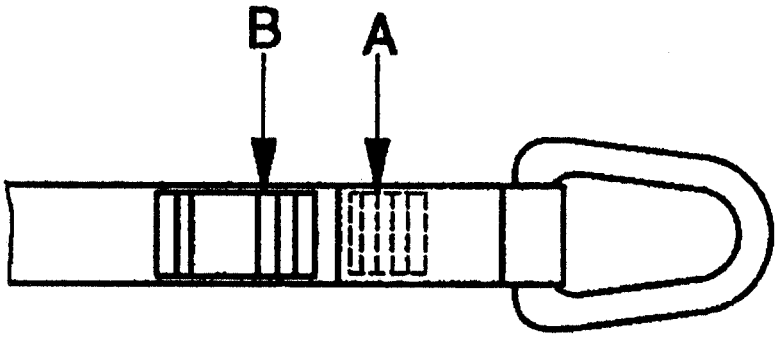


Figure 6 — Typical attachment of label on a sling with fittings

7.3 Marking for multi-leg sling assemblies

The following requirements shall apply to 2 leg, 3 leg or 4 leg sling assemblies:

a) the marking shall be on a readily-identifiable form of durable label (e.g. a round tag) which shall be attached to the master link to differentiate from other sling types;

b) the marking of the sling shall include the maximum angle of use of any leg to the vertical;

c) the label on each leg shall not show the WLL.

8 Manufacturer's certificate

After all testing and examination, as specified in clause 6, the manufacturer shall issue to the purchaser, for each batch of slings delivered, a certificate which shall include at least the following information:

a) the manufacturer's name and address, symbol or mark ⟦A1⟩ and, where applicable, the name and address of the authorized representative ⟨A1⟧;

b) WLL of the sling, and for multi-leg sling assemblies the range of angles to the vertical;

c) type, including eye, fitting, number of legs, nominal length and width;

d) the expression 'flat woven webbing sling' or 'flat woven sling assembly';

e) material of the webbing;

f) grade of fitting;

g) if fitted, details of reinforcements and protection against damage from edges and/or abrasion;

h) the number of this European Standard, i.e. EN 1492-1;

i) test references (see clause 6);

j) traceability code;

k) identity of the person authorized to sign the certificate on behalf of the manufacturer and date of signature;

l) ⟦A1⟩ the static test coefficient(s) used for design of component(s) (e.g. hook; link; shackle). ⟨A1⟧

NOTE Items b) to h) inclusive form the designation of the sling or sling assembly.

9 Instructions for use

Instructions for use shall accompany each sling or each delivery of slings supplied with a single order and shall conform to annex B.

Annex A
(normative)

Methods of test to verify safety requirements

A.1 General

A.1.1 All testing and examination shall be carried out using a tensile test machine conforming to the requirements of class 1 of EN 10002-2:1991 and, where applicable, a steel tape or rule graduated in increments of 1 mm.

A.1.2 During load tests, the force shall be applied to the representative sewn webbing component so that the elongation of the specimen takes place at a maximum rate of 110 mm/min per 1000 mm length of the specimen.

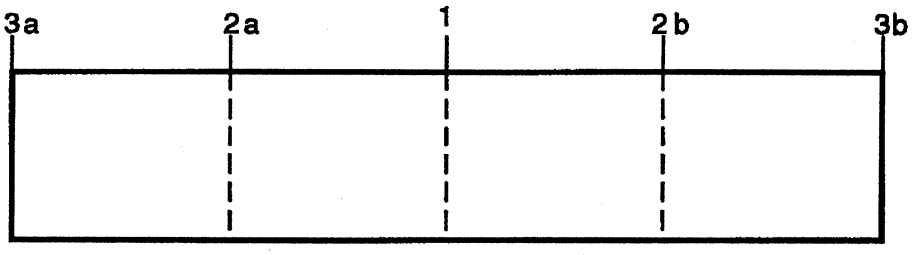
A.1.3 The representative sewn webbing component shall not be pre-loaded prior to testing, unless all of the sewn webbing components of that type are subject to identical pre-loading, in which case they shall not be pre-loaded to more than two times the WLL.

WARNING — During load test procedures, considerable energy is stored in the webbing under tension. If the sample breaks, this energy will be suddenly released. Suitable precautions should therefore be taken to protect persons in the danger zone.

A.2 Test to determine the change in webbing width under load

A.2.1 A representative sewn webbing component shall be mounted in the test machine and arranged so that it is under no load, but forms a gentle catenary.

A.2.2 A mark shall be placed across the face of the webbing, normal to the longitudinal axis, at the mid-point of the specimen. A further mark shall be placed each side of the centre mark mid way between the central mark and bearing point of the sewn webbing component, thus dividing it into four parts of equal length (See figure A.1).



1) - Mid point

2) - Dividing marks

3) - Bearing point of sewn webbing component

Figure A.1 — Position of marking to divide sewn webbing component into four equal parts

A.2.3 The width of the webbing shall be measured at each of the marks to the nearest millimetre, and each of these measurements shall be recorded as W1.

A.2.4 The sewn webbing component shall then be subjected to a force equivalent to twice its WLL.

A.2.5 Whilst this force is maintained the width of the webbing shall be measured at each of the marks to the nearest millimetre, and each of these measurements shall be recorded as W2.

A.2.6 The change in dimension at each of the three locations shall be calculated and expressed as a percentage using the formula {(W2 - W1) W1} x 100.

A.2.7 The webbing shall be rejected if, at any one of the measured points, there is a decrease in its width of more than -10% for webbings of nominal width less than or equal to 100 mm, and -12% for webbings of nominal width over 100 mm.

A.3 Test to verify the WLL of a sewn webbing component

A.3.1 Endless sewn webbing components, sling type A

A representative sling or sewn webbing component shall be mounted, straight and without twist, between the pins or bollards of the test machine. The joining seam shall be kept clear of the pins or bollards. The diameter of the pins or bollards is arbitrary. The specimen shall be subjected to a force equivalent to not less than 7 times the WLL of the sewn webbing component.

A.3.2 Single sewn webbing components, sling type B

A representative sling or sewn webbing component shall be mounted, straight and without twist, between the pins or bollards of the test machine. The diameter of the pins or bollards shall be such that the included angle of the eyes of the specimen is not less than 10 ° nor greater than 20 °. The specimen shall be subjected to a force equivalent to not less than 7 times the WLL of the sewn webbing component.

A.3.3 Acceptance criteria

A.3.3.1 If the representative sewn webbing component sustains the force equivalent to 7 times the WLL of the sewn webbing component, the specimen shall have passed the test. Testing beyond this force is not required.

A.3.3.2 If the representative sewn webbing component fails to sustain the force equivalent to 7 times the WLL of the sewn webbing component, the specimen shall have failed the test. Further sample testing shall only be carried out if the requirements of 6.2.1, 6.3.2 or 6.3.3 are met.

A.3.4 Manufacturer's record

The results of the test, i.e. whether the representative sewn webbing component was accepted or rejected, shall be recorded for the purposes of the manufacturer’s record.

A.4 Type test for verifying the interaction of the sewn webbing component with fittings for slings type C/Cr

A.4.1 A representative sewn webbing component, of the type intended for use with fittings, sling types C/Cr, shall be sewn to a suitably designed test fitting, representing the smallest profile of engagement of the range of fittings (see informative annex C).

A.4.2 The specimen shall be mounted, straight and without twist, between the pins or bollards of the test machine. The contact radius of the pin or bollard shall be such that it supports the representative fitting over sufficient area so as to prevent the fitting from distorting or twisting whilst under test. The specimen shall be submitted to a force equivalent to 5 times the WLL of the sewn webbing component.

A.4.3 Acceptance criteria

A.4.3.1 If the sewn webbing component sustains a force equivalent to 5 times its WLL, it shall have passed the test.

A.4.3.2 If the representative sewn webbing component fails to sustain the force equivalent to 5 times its WLL, the specimen shall have failed the test. Further sample testing shall only be carried out if the requirements of 6.2.2 are met.

A.4.4 Manufacturer's record

The results of the test, i.e. whether the representative sewn webbing component was accepted or rejected, shall be recorded for the purposes of the manufacturer’s record.

Annex B
(normative)

Information for use and maintenance to be provided by the manufacturer

B.1 Scope

This annex gives guidance to the manufacturer as to the information on use and maintenance which shall be provided with flat woven webbing slings conforming to this Part of EN 1492.

NOTE Annex D is informative, and provides some detailed information for use and maintenance which may be appropriate.

B.2 General

The manufacturer of flat woven webbing slings shall provide documented information, covering the subjects listed below, with each commercially indivisible batch of slings (see clause 9). Informative annex D contains guidance to assist the manufacturer in the preparation of this information.

B.3 Limitations on the use of the sling due to environmental conditions or hazardous applications (see D.1)

a) selective material resistance to chemicals;

b) restrictions due to temperature;

c) susceptibility to cutting and abrasion;

d) degradation due to ultra-violet radiation.

B.4 Before putting the sling into first use (see D.2.1)

a) availability of manufacturer’s certificate;

b) availability of instruction and training.

B.5 Before each use/period of use (see D.2.2 and D.2.3)

a) inspection procedure;

b) presence of label and legibility of marking;

c) withdrawal criteria.

B.6 Selection and use of flat woven webbing slings (see D.3)

a) determination of the mass of the load, its centre of gravity, attachment points and proposed method of attachment;

b) observance of the marked WLL(s) and mode factors. In the case of multi-leg slings, this will include restrictions on angle of sling legs;

c) attachment of sling to hook of lifting machine;

d) attachment of sling to load: direct attachment, choke hitch, basket hitch, special fittings, other lifting accessories;

e) protection of sling and load;

f) controlling rotation of the load;

g) ensuring an even balance of the load, avoidance of shortening sling legs, e.g. by twisting, knotting, etc;

h) shock loading;

i) safety of personnel;

j) clamping force;

k) preparation of landing site;

l) detachment of sling;

m) correct storage of sling.

B.7 Periodic thorough examination and maintenance

a) withdrawal criteria including missing/damaged label or illegible marking;

b) records of examination.

Annex C
(informative)

Guidance to the manufacturer for the conduct of type testing to verify the interaction of the sewn webbing component with fittings for sling type C/Cr in accordance with A.4

C.1 This test is intended to verify that the WLL of the sewn webbing component is not adversely affected by its interaction with the smallest profile of engagement of the fittings which it will meet in service.

C.2 As the cutting effect, commonly referred to as the blunt knife effect, is lessened as the profile of engagement is increased, it is only necessary to make the test against the smallest profile of engagement.

C.3 The type test is not therefore required to be repeated if fittings with a larger profile of engagement are fitted to a sling, if a test record is already available for a similar representative sewn webbing component.

C.4 In most cases the failure force of the fitting will be lower than that of the sewn webbing component to which it will be attached. A suitably designed test fitting representative of the smallest profile of engagement associated with the particular webbing should therefore be used for the test.

C.5 The representative fitting may be a suitably designed and manufactured test jig, produced solely for the purpose of conducting the test and capable of re-use. It need not duplicate the actual fitting's shape for attachment to other accessories or lifting appliances provided that the profile of engagement with the sewn webbing component is identical to that of the smallest production fitting used. It may be of greater depth and/or higher grade material, so as to ensure it will not distort or fail under test.

C.6 The sewn webbing component should be identical to that of the production run. In order to accept the test fitting, the eye of may be of greater depth.

Annex D
(informative)

Suggested content of information to be provided by the manufacturer with flat woven webbing slings

D.1 Use of flat woven webbing slings in adverse conditions or hazardous applications

D.1.1 The material from which flat webbing slings are manufactured have selective resistance to chemicals. The resistance of man-made fibres to chemicals is summarized below:

a) polyester (PES) is resistant to most mineral acids but is damaged by alkalis;

b) polyamides (PA) are virtually immune to the effect of alkalis; however, they are attacked by mineral acids;

c) polypropylene (PP) is little affected by acids or alkalis and is suitable for applications where the highest resistance to chemicals other than solvents is required.

Solutions of acids or alkalis which are harmless can become sufficiently concentrated by evaporation to cause damage. Contaminated slings should be taken out of service at once, soaked in cold water, dried naturally and referred to a competent person for examination.

Slings with grade 8 fittings and multi-leg slings with grade 8 master links should not be used in acidic conditions. Contact with acids or acidic fumes causes hydrogen embrittlement to grade 8 materials.

If exposure to chemicals is likely, the manufacturer or supplier should be consulted.

D.1.2 Flat woven webbing slings are suitable for use and storage in the following temperature ranges:

a) polyester and polyamide: -40 °C to 100 °C,

b) polypropylene: -40 °C to 80 °C.

At low temperatures ice formation will take place if moisture is present. This may act as a cutting agent and an abrasive causing internal damage to the sling. Further, ice will lessen the flexibility of the sling, in extreme cases rendering it unserviceable for use.

These ranges vary in a chemical environment, in which case the advice of the manufacturer or supplier should be sought.

Limited indirect ambient heating, within these ranges, is acceptable for drying.

D.1.3 The man-made fibres from which the webbing is produced are susceptible to degradation if exposed to ultra-violet radiation. Flat woven webbing slings should not be exposed or stored in direct sunlight or sources of ultra-violet radiation.

D.2 Inspection of flat woven webbing slings in service

D.2.1 Before first use of the sling it should be ensured that:

a) the sling corresponds precisely to that specified on the order;

b) the manufacturer's certificate is to hand;

c) the identification and WLL marked on the sling correspond with the information on the certificate.

D.2.2 Before each use, the sling should be inspected for defects and to ensure that the identification and specification are correct. A sling that is unidentified or defective should never be used, but should be referred to a competent person for examination.

D.2.3 During the period of use, frequent checks should be made for defects or damage, including damage concealed by soiling, which might affect the continued safe use of the sling. These checks should extend to any fittings and lifting accessories used in association with the sling. If any doubt exists as to the fitness for use, or if any of the required markings have been lost or become illegible, the sling should be removed from service for examination by a competent person.

The following are examples of defects or damage likely to affect the fitness of slings for continued safe use:

a) Surface chafe. In normal use, some chafing will occur to the surface fibres. This is normal and has little effect. However, the effects are variable and as the process continues, some loss of strength should be expected. Any substantial chafe, particularly localized, should be viewed critically. Local abrasion, as distinct from general wear, can be caused by sharp edges whilst the sling is under tension, and can cause serious loss of strength.

b) Cuts. Cross or longitudinal cuts, cuts or chafe damage to selvedges, cuts to stitching or eyes.

c) Chemical attack. Chemical attack results in local weakening and softening of the material. This is indicated by flaking of the surface which may be plucked or rubbed off.

d) Heat or friction damage. This is indicated by the fibres taking on a glazed appearance and in extreme cases, fusion of the fibres can occur.

e) Damaged or deformed fittings.

D.3 Correct selection and use of flat woven webbing slings

D.3.1 When selecting and specifying slings made from man-made fibres, consideration should be given to the required working load limit, taking into account the mode of use and the nature of the load to be lifted. The size, shape and weight of the load, together with the intended method of use, working environment and nature of the load, all affect the correct selection.

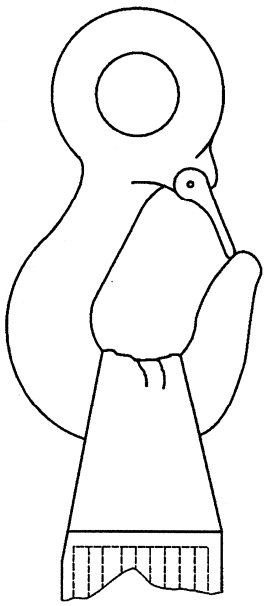
The selected sling should be both strong enough and of the correct length for the mode of use. If more than one sling is used to lift a load, these slings should be identical. The material from which the webbing is made should not be affected adversely by the environment or the load.

Consideration should also be given to ancillary fittings and lifting devices which should be compatible with the sling(s). The termination of the sling should also be considered i.e. whether fittings or soft eyes are required.

D.3.2 When using slings with soft eyes, the minimum eye length for a sling for use with a hook should be not less than 3,5 times the maximum thickness of the hook and in any event the angle formed in the eye of the sling should not exceed 20 °.

When connecting a sling with soft eyes to a lifting appliance, the part of the lifting appliance which bears on the sling should be essentially straight, unless the bearing width of the sling is not more than 75 mm in which case the radius of curvature of the lifting appliance attachment should be at least 0,75 times the bearing width of the sling. Figure D.1 illustrates the problem of accommodating webbing on a hook of radius less than 0,75 times the bearing width of the sling.

Wide webbings may be affected by the radius of the inside of the hook as a result of the curvature of the hook preventing uniform loading across the width of the webbing.



NOTE Eye reinforcement not shown for clarity

Figure D.1 — Illustration showing inadequate accommodation of a webbing eye on a hook of too small radius

D.3.3 Flat woven webbing slings should not be overloaded: the correct mode factor should be used (see table 3). Working load limits for some modes may be given on the label. In the case of multi-leg slings the maximum angle to the vertical should not be exceeded.

D.3.4 Good slinging practices should be followed: the slinging, lifting and lowering operations should be planned before commencing the lift.

D.3.5 Flat woven webbing slings should be correctly positioned and attached to the load in a safe manner. Slings should be placed on the load such that the loading is uniform across their width. They should never be knotted or twisted.

Stitching should never be placed over hooks or other lifting devices: the stitching should always be placed in the standing part of the sling. Damage to labels should be prevented by keeping them away from the load, the hook and the angle of choke.

D.3.6 In the case of multi-leg slings, the WLL values have been determined on the basis that the loading of the sling assembly is symmetrical. This means that when a load is lifted the sling legs are symmetrically disposed in plan and subtended at the same angle to the vertical.

In the case of 3 leg slings, if the legs are not symmetrically disposed in plan the greatest tension is in the leg where the sum of the plan angles to the adjacent legs is greatest. The same effect occurs in 4 leg slings except that the rigidity of the load should also be taken into account.

NOTE With a rigid load the majority of the weight may be taken by only three, or even two, of the legs, with the remaining legs only serving to balance the load.

D.3.7 Slings should be protected from edges, friction and abrasion, whether from the load or the lifting appliance. Where reinforcements and protection against damage from edges and/or abrasion is supplied as part of the sling, this should be correctly positioned. It may be necessary to supplement this with additional protection.

D.3.8 The load should be secured by the sling(s) in such a manner that it cannot topple or fall out of the sling(s) during the lift. Sling(s) should be arranged so that the point of lift is directly above the centre of gravity and the load is balanced and stable. Movement of the sling over the lifting point is possible if the centre of gravity of the load is not below the lifting point.

When using basket hitch, the load should be secure since there is no gripping action as with choke hitch and the sling can roll through the lifting point. For slings which are used in pairs, the use of a spreader is recommended so that the sling legs hang as vertically as possible and to ensure that the load is equally divided between the legs.

When a sling is used in choke hitch, it should be positioned so as to allow the natural (120°) angle to form and avoid heat being generated by friction. A sling should never be forced into position nor an attempt made to tighten the bite. The correct method of securing a load in a double choke hitch is illustrated in figure D.2. A double choke hitch provides greater security and helps to prevent the load sliding through the sling.

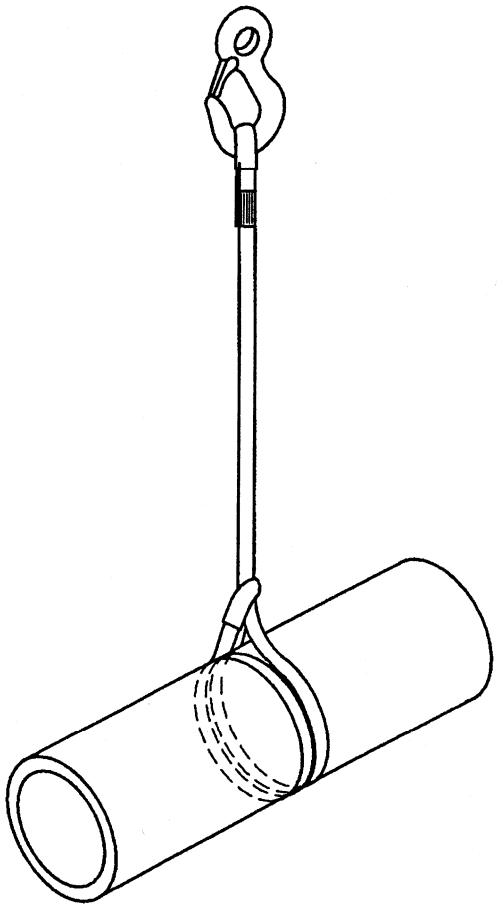


Figure D.2 — Double choke hitch

D.3.9 Care should be taken to ensure the safety of personnel during the lift. Persons in the danger area should be warned that the operation is to take place and, if necessary, evacuated from the immediate area.

Hands and other parts of the body should be kept away from the sling to prevent injury as the slack is taken up.

Reference should also be made to ISO 12480-1 for planning and management of the lifting operation and the adoption of safe systems of working.

D.3.10 A trial lift should be made. The slack should be taken up until the sling is taut. The load should be raised slightly and a check made that it is secure and assumes the position intended. This is especially important with basket or other loose hitches where friction retains the load.

If the load tends to tilt, it should be lowered and attachments re-positioned. The trial lift should be repeated until the stability of the load is ensured.

D.3.11 Care should be taken when making the lift to ensure that the load is controlled, e.g. to prevent accidental rotation or collision with other objects.

Snatch or shock loading should be avoided as this will increase the forces acting on the sling.

A load in the sling or the sling itself should not be dragged over the ground or rough surfaces.

D.3.12 The load should be lowered in an equally controlled manner as when lifted.

Trapping the sling when lowering the load should be avoided. The load should not rest on the sling, if this could cause damage and pulling the sling from beneath the load when the load is resting on it should not be attempted.

D.3.13 On completion of the lifting operation the sling should be returned to proper storage.

When not in use, slings should be stored in clean, dry and well ventilated conditions, at ambient temperature and on a rack, away from any heat sources, contact with chemicals, fumes, corrodible surfaces, direct sunlight or other sources of ultra-violet radiation.

D.3.14 Prior to placing in storage, slings should be inspected for any damage which may have occurred during use. Slings should never be returned damaged to storage.

D.3.15 Where lifting slings have come into contact with acids and/or alkalis, dilution with water or neutralization with suitable media is recommended prior to storage.

Depending on the material of the lifting sling and on the chemicals referred to in D.1.1, it may be necessary in some cases to request from the supplier additional recommendations on the cleaning procedure to be followed after the sling has been used in the presence of chemicals.

D.3.16 Slings which have become wet in use, or as the result of cleaning, should be hung up and allowed to dry naturally.

D.4 Examination and repair

Examination periods should be determined by a competent person, taking into account the application, environment, frequency of use and similar matters, but in any event slings should be visually examined at least annually by a competent person to establish their fitness for continued use.

Records of such examinations should be maintained.

Damaged slings should be withdrawn from service. Never attempt to carry out repairs to the slings yourself.

Annex ZA
(informative)

〈A1〉 Relationship between this European Standard and the Essential Requirements of EU Directive 98/37/EC

This European Standard has been prepared under a mandate given to CEN by the European Commission and the European Free Trade Association to provide a means of conforming to Essential Requirements of the New Approach Directive 98/37/EC, amended by 98/79/CE on machinery.

Once this standard is cited in the Official Journal of the European Communities under that Directive and has been implemented as a national standard in at least one Member State, compliance with the normative clauses of this standard confers, within the limits of the scope of this standard, a presumption of conformity with the relevant Essential Requirements of that Directive and associated EFTA regulations.

WARNING - Other requirements and other EU Directives may be applicable to the product(s) falling within the scope of this standard. 〈A1〉

Annex ZB
(informative)

A1 Relationship between this European Standard and the Essential Requirements of EU Directive 2006/42/EC

This European Standard has been prepared under a mandate given to CEN by the European Commission and the European Free Trade Association to provide a means of conforming to Essential Requirements of the New Approach Directive 2006/42/EC on machinery.

Once this standard is cited in the Official Journal of the European Communities under that Directive and has been implemented as a national standard in at least one Member State, compliance with the normative clauses of this standard confers, within the limits of the scope of this standard, a presumption of conformity with the relevant Essential Requirements of that Directive and associated EFTA regulations.

WARNING - Other requirements and other EU Directives may be applicable to the product(s) falling within the scope of this standard. A1

Bibliography

Informative reference is made in this document to the following publications:

ISO 1833 (see note 1 to 5.1) Textiles – Binary fibre mixtures – Quantitative chemical analysis

ISO 2076 (see note 1 to 5.1) Man-made fibres – Generic names

ISO 12480-1 (see D.3.9) Cranes – Safe use – Part 1: General