

English Version

## Textile slings - Safety - Part 2: Roundslings made of man-made fibres for general purpose use

Elingues textiles - Sécurité - Partie 2: Elingues rondes en textiles chimiques d'usage courant

Textile Anschlagmittel - Sicherheit - Teil 2: Rundschlingen aus Chemiefasern für allgemeine Verwendungszwecke

This European Standard was approved by CEN on 30 June 2000 and includes Corrigendum 1 issued by CEN on 7 June 2006 and Amendment 1 approved by CEN on 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 1492-2:2000+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of an identical text or by endorsement, at the latest by May 2009, and conflicting national standards shall be withdrawn at the latest by December 2009.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 1492-2:2000.

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 roundslings conforming to this European Standard.

Annex C 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 roundslings up to 40 tonnes working load limit (in straight lift) and two-, three-, and four-leg roundslings assemblies, with or without fittings, made of polyamide, polyester and polypropylene.

The roundslings 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 WLL's specified. Lifting operations not covered by this standard 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.

Roundslings 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 roundslings indicated below:

- a) roundslings designed for securing or lashing of cargoes to each other on pallets and platforms or in vehicles;
- b) slings of tubular webbing without filling.

This European Standard deals with the technical requirements to minimize the hazards listed in clause 4 which can arise during the use of roundslings 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/A11995, 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 9002:1994, 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 and definitions, symbols and abbreviations apply.

#### 3.1

##### **roundsling**

endless flexible sling consisting of a loadbearing core of yarn, completely enclosed in a woven cover, with or without fittings.

#### 3.2

##### **multi-leg sling assembly**

roundsling assembly, consisting of two, three or four identical roundslings attached to a master link (See table 2)

#### 3.3

##### **representative sling**

roundsling representative of roundslings of the same type, which is used for verification purposes (See 6.2 and 6.3)

NOTE This may differ from the production roundsling in length only

#### 3.4

##### **core**

hank of yarn which comprises the loadbearing part of a roundsling.

#### 3.5

##### **cover**

woven tubular webbing, or tube made from woven fabric and joined along its length, and which encloses the core.

#### 3.6

##### **closed surface**

webbing surface (of cover) 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  
fitting**

loadbearing metal component, supplied as part of a roundsling so as to allow it to be attached to other lifting accessories, connected to other roundslings to form a multi-leg sling assembly or connected to the hook of a crane or other lifting machine.

**3.8  
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.

**3.9  
nominal length**

specified length of the roundsling, inclusive of fittings, from bearing point to bearing point (See 5.5)

**3.10  
effective working length (EWL)**

actual finished length of the roundsling, inclusive of fittings, from bearing point to bearing point (See 5.5)

**3.11  
working load limit (WLL)**

maximum mass which a roundsling is designed to sustain in straight lift and which a sling or sling assembly is authorized to sustain in general lifting service (See table 2)

**3.12  
mode factor (M)**

factor applied to the WLL of a roundsling in order to arrive at the WLL of the roundsling or sling assembly for a given mode of assembly or use.

**3.13  
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 roundslings 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 C (informative).

Table 1 lists those hazards in as 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 roundslings 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/sub-clause 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	5.9
27.6	Inadequate selection of lifting accessories hazard	4.1.2.5	5.9
		4.3.2	7

## 5 Safety Requirements

### 5.1 Materials

The roundsling shall be produced wholly from industrial yarns 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:

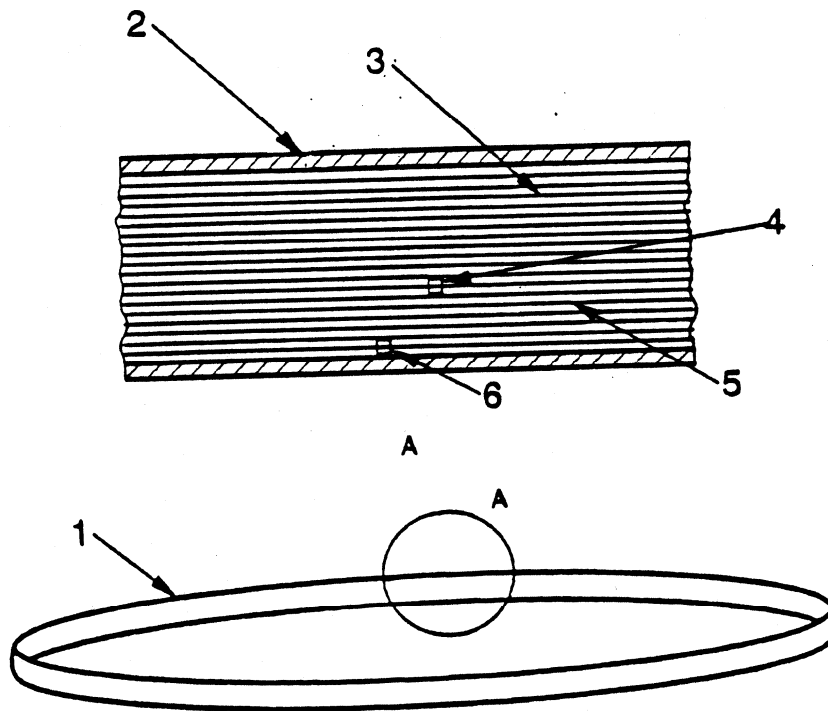
- polyamide (PA), high tenacity multifilament;
- polyester (PES), high tenacity multifilament;
- polypropylene (PP), high tenacity multifilament.

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 C.

## 5.2 Core

The core shall be formed from one or more yarns of identical parent material (see 5.1) wound together with a minimum of 11 turns, and joined to form an endless hank. It shall be uniformly wound to ensure even distribution of the load. Any additional joins in the yarns shall be separated by at least four turns of the yarn and shall be compensated for by an extra turn per join (See figure 1).



- 1) Roundsling
- 2) Cover
- 3) Core yarns
- 4) Additional join
- 5) Minimum of four turns of yarn
- 6) Join forming endless hank

Figure 1 — Principle of core construction

## 5.3 Cover

The cover shall be of webbing woven from identical parent material (see 5.1) as the core, and made with the ends overlapped and sewn. The edges of the woven cover material shall be finished in such a way that they cannot unravel. If the cover is welded, care shall be taken to ensure that the welding does not affect the core. The woven material of the cover 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 woven material and/or the yarn.

## 5.4 Sewing

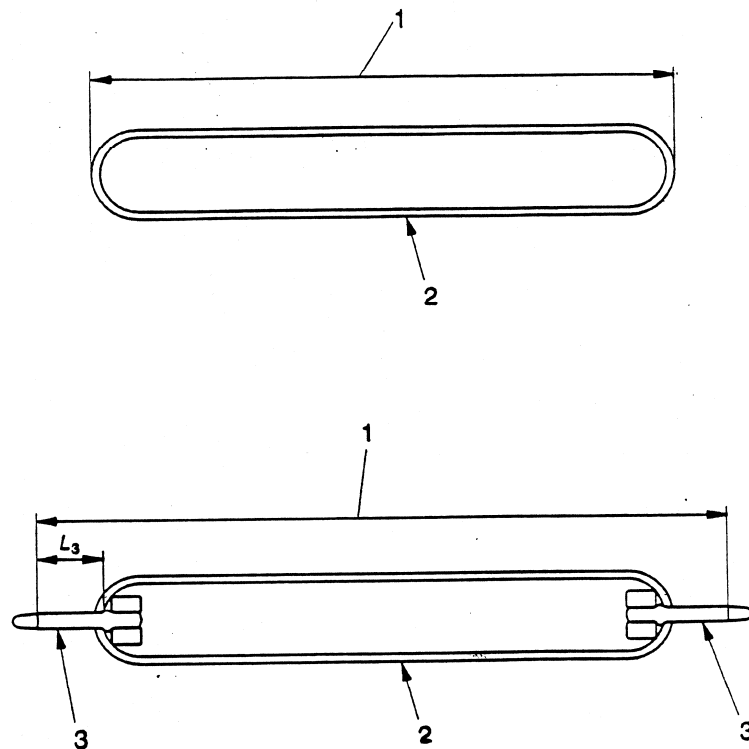
The thread of all seams shall be made of identical parent material (see 5.1) as the cover and core, and the seam shall be made with a locking stitch machine.



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

### 5.5 Effective working length (EWL)

The effective working length (EWL),  $l_1$ , of a roundsling (see figure 2) shall not differ from the nominal length by more than 2 % of the nominal length, when laid flat and pulled taut by hand tension and measured with a steel tape or rule graduated in increments of 1 mm.



- 1) Effective working length ( $l_1$ )
- 2) Roundsling
- 3) Integral fitting

Figure 2 — Effective working length




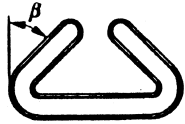
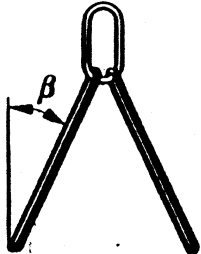
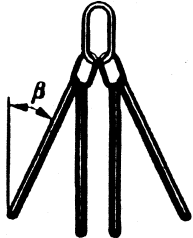
### 5.6 Colour coding

The colour of the cover shall be as given in table 2 to indicate the WLL of the roundsling in straight lift. Roundslings of any other nominal WLL's, not indicated in table 2, shall not be denoted with the colours indicated therein.

### 5.7 Working load limits

The WLL of a roundsling, or sling assembly, for a given mode of assembly or use shall be derived from the WLL of the roundsling in straight lift multiplied by the appropriate mode factor,  $M$ , in accordance with table 2.

Table 2 — Working load limits and colour codes

WLL of roundsling in straight lift	Colour of roundsling cover	Working load limits in tonnes									
		Straight lift	Choked lift	Basket hitch		Two leg sling		Three and four leg slings			
											
				Parallel	$\beta = 0 \text{ to } 45^\circ$	$\beta = 45^\circ \text{ to } 60^\circ$	$\beta = 0 \text{ to } 45^\circ$	$\beta = 45^\circ \text{ to } 60^\circ$	$\beta = 0 \text{ to } 45^\circ$	$\beta = 45^\circ \text{ to } 60^\circ$	
		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°

## 5.8 Failure force

The minimum failure force for the roundsling core in straight pull shall be such that it will sustain a force equivalent to 7 times the WLL when the sling is tested in accordance with annex A, but during the test the cover shall not rupture at a force equivalent to less than 2 times the WLL. The roundsling shall not be pre-loaded prior to testing, unless all roundslings of the same type are subjected to identical pre-loading.

## 5.9 Fittings supplied as part of a sling

**5.9.1** Fittings shall conform with 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).

**5.9.2** The seating of a fitting in contact with the roundsling shall be so finished as to allow the roundsling to adopt a natural (flattened) form under load and, when the roundsling is tested in accordance with annex A:

- a) there shall be no damage to the area of the roundsling in contact with the fitting;
- b) the roundsling shall sustain the load.

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

## 5.10 Protection against damage from edges and/or abrasion

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 roundsling which is to be protected.

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

## 5.11 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 the core and cover material;
- 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 roundsling of each type or construction, including change of material, shall be tested to verify the WLL. The test shall be in accordance with A.2.

If, during testing, the roundsling 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** The first representative roundsling of each type or construction with integral fittings shall be tested to verify the interaction of the roundsling with those fittings. The test shall be in accordance with A.5.

If, during testing, the cover of the roundsling fails to sustain a force equivalent to two times the WLL of the roundsling, but sustains a load of not less than 90% of this force, three further samples of the same type shall be tested. If the cover of one or more of these samples does not sustain a force equivalent to two times the WLL, 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 EN ISO 9002 is in place**

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

**Table 3 — Testing intervals**

WLL of roundsling in straight pull	Maximum quantity per type between tests
Up to and including 3 t	1000
Over 3 t	500

If, during testing, the roundsling 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, roundslings shall be selected for testing at the intervals given in table 4 or every 12 months, whichever is the sooner. The selected slings shall be tested to verify the WLL in accordance with A.2.

Table 4 — Testing intervals

WLL of roundsling in straight pull	Maximum quantity per type between tests
Up to and including 3 t	500
Over 3 t	250

If, during testing, the roundsling 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 roundsling or sling assembly shall be visually and manually examined including measurement of 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 roundsling shall include the following:

- a) the working load limit, in straight pull;
- b) the material of the roundsling, 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  $\boxed{A_1}$  and, where applicable, the name and address of the authorized representative  $\boxed{A_1}$ ;
- f) the traceability code (see 5.11);
- g) the number and relevant Part of this European Standard.

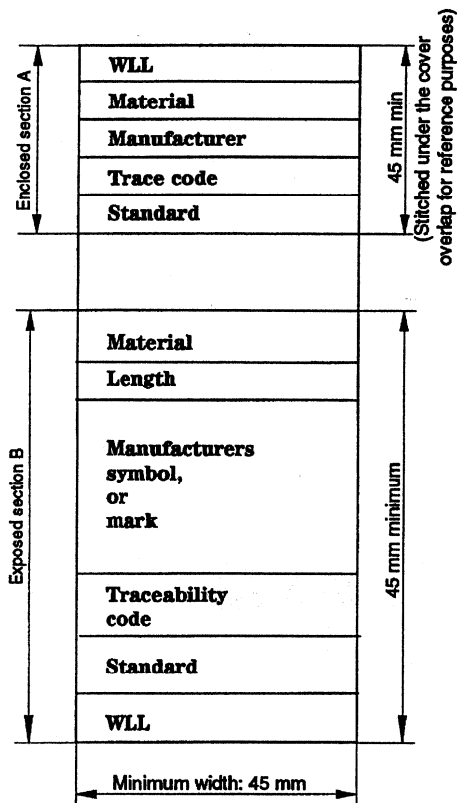
NOTE Marking this European Standard number on or in relation to a product represents a manufacturer's declaration of conformity, i.e. a claim by or on behalf of the manufacturer that the product meets the requirements of the standard. Such a declaration is not to be confused with third-party certification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

7.2 Label

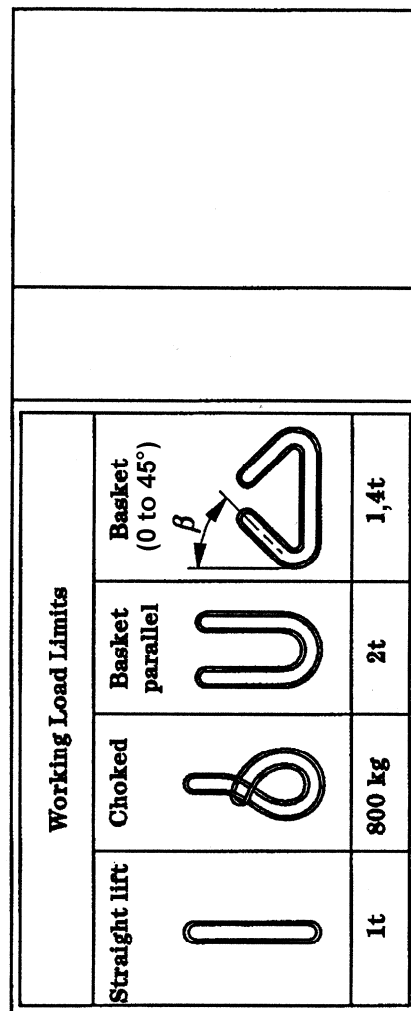
7.2.1 The information shall be marked (in accordance with 7.1) both legibly and indelibly, on a durable label fixed directly onto the roundsling. It shall be marked in a type size of not less than 1,5 mm in height. A section of the label shall be stitched under the cover which shall also be marked with this information for reference purposes. A typical label is shown in figure 3 and figure 4 shows the typical methods of attachment of the label.

7.2.2 The material from which the roundsling 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



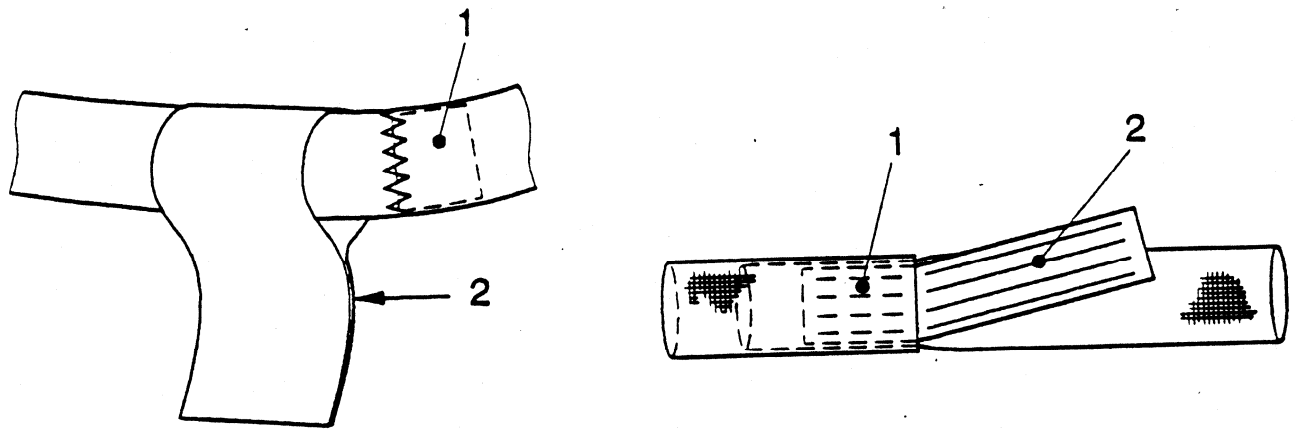
AC b) Reverse (optional) AC

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 roundsling in various modes of use AC (see Figure 3 b) AC.

NOTE Typical methods for label attachment are shown in figure 3.

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



**Key**

- 1 Enclosed section A  
2 Exposed section B

**Figure 4 — Typical methods of attachment of label**

### 7.3 Marking for multi-leg sling assemblies

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

- 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;
- the marking of the sling assembly shall include the maximum angle of use of any leg to the vertical;
- 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:

- the manufacturer's name and address, symbol or mark and, where applicable, the name and address of the authorized representative;
- WLL of the sling, and for multi-leg sling assemblies the range of angles to the vertical;
- type, including fitting, number of legs and nominal length;
- the expression 'roundsling' or 'roundsling assembly';
- material of the roundsling;
- grade of fitting;

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- g) if fitted, details of protective sleeves;
- h) the number of this European Standard, i.e. EN 1492-2;
- 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)  $\overline{A_1}$  the static test coefficient(s) used for design of component(s) (e.g. hook; link; shackle).  $\overline{A_1}$

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

### 9 Instructions for use

Instructions for use shall accompany each sling or each delivery of slings supplied against 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 by a competent person, 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 roundsling 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 roundsling shall not be pre-loaded prior to testing, unless all of the roundslings 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 roundsling 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 verify the WLL of a roundsling

A representative roundsling shall be mounted, straight and without twist, between the pins or bollards of the test machine, so that the core is evenly distributed on the pins or bollards and so that there are no folds in the cover at the contact area. The joining seam in the cover shall be kept clear of the pins or bollards. The maximum contact diameter of the pins or bollards shall be in accordance with table A.1. The use of bollards with a smaller contact diameter is permitted, but when used, all comparative or repeat tests shall be made using bollards of the same contact diameter as were used for the initial test. The specimen shall be subjected to a force equivalent to not less than 7 times the WLL of the roundsling.

**Table A.1 — Maximum contact radii of bollards or pins**

WLL of roundsling (t)	Maximum contact radii of bollard or pin, r, (mm)	
$\leq 3$	25	
$> 3 \leq 5$	40	
$> 5 \leq 10$	50	
$> 10 \leq 20$	75	
$> 20 \leq 40$	120	

### A.3 Acceptance criteria

**A.3.1** If the representative roundsling sustains a force equivalent to 7 times the WLL and if, during the test, the cover does not rupture at a force equivalent to less than 2 times the WLL, the specimen shall have passed the test. Testing beyond this force is not required.

NOTE The cover of a roundsling may rupture prior to the core, therefore during this test the roundsling is deemed to fail when the core fails to sustain the load.

**A.3.2** If the representative roundsling fails to sustain the force equivalent to 7 times the WLL, or if the cover ruptures at a force equivalent to less than 2 times the WLL, of the roundsling, 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.4 Manufacturer's record

The results of the test, i.e. whether the representative roundsling was accepted or rejected, shall be recorded for the purposes of the manufacturer's record.

### A.5 Type test for verifying the interaction of the roundsling with integral fittings

A representative roundsling with integral fittings shall be mounted, straight and without twist, in the test machine. The roundsling shall be arranged on the fittings in the manner in which it is intended to be used. The contact area of the pins or bollards shall be such that they support the fittings over sufficient area so as to prevent the fittings from distorting or twisting whilst under test. The specimen shall be submitted to a force equivalent to 2 times the WLL of the roundsling. The specimen shall then be removed from the test machine and be visually examined, paying particular attention to the areas of the cover material in contact with the fittings.

### A.6 Acceptance criteria

**A.6.1** If the cover of the representative roundsling has not ruptured and the specimen shows no signs of cutting or other damage, it shall have passed the test.

**A.6.2** If the cover of the representative roundsling ruptures, is cut or damaged, 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.7 Manufacturer's record

The results of the test, i.e. whether the representative roundsling with fittings 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 roundslings conforming to this Part of EN 1492.

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

### **B.2 General**

The manufacturer of roundslings shall provide documented information, covering the subjects listed below, with each commercially indivisible batch of slings (see clause 9). Informative annex C 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 C.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 C.2.1)**

- a) availability of manufacturer's certificate;
- b) availability of instruction and training.

### **B.5 Before each use/period of use (see C.2.2 and C.2.3)**

- a) inspection procedure;
- b) presence of label and legibility of marking;
- c) withdrawal criteria.

## **B.6 Selection and use of roundslings (see C.3)**

- a) determination of the mass of the load, its centre of gravity, attachment points and proposed method of attachment;
- b) observation 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 even an 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)

### **Suggested content of information to be provided by the manufacturer with roundslings**

#### **C.1 Use of roundslings in adverse conditions or hazardous applications**

**C.1.1** The material from which roundslings 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.

#### **C.1.2 Roundslings 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.

**C.1.3** The man-made fibres from which the roundslings are produced are susceptible to degradation if exposed to ultra-violet radiation. Roundslings should not be stored in direct sunlight or sources of ultra-violet radiation.

## **C.2 Inspection of roundslings in service**

**C.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.

**C.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.

**C.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.

Any damage evident in the cover indicates potential damage to the loadbearing core. 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 of the cover. This is normal and has little effect. 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 lead to the cover becoming cut.
- b) Cuts. Cross or longitudinal cuts in the cover, or any damage to the stitching, raise serious doubts as to the integrity of the core.
- c) Exposed core.
- d) Chemical attack. Chemical attack results in local weakening and softening of the material. This is indicated by flaking of the cover surface which may be plucked or rubbed off. Any signs of chemical attack to the cover raise serious doubts as to the integrity of the core.
- e) Heat or friction damage. This is indicated by the fibres of the cover material taking on a glazed appearance and in extreme cases, fusion of the fibres can occur, indicating a weakening of the core.
- f) Damaged or deformed fittings.

### C.3 Correct selection and use of roundslings

**C.3.1** When selecting and specifying roundslings, 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 roundsling 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).

**C.3.2** Roundslings should not be overloaded: the correct mode factor should be used (see 5.7 table 2). 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.

**C.3.3** Good slinging practices should be followed: the slinging, lifting and lowering operations should be planned before commencing the lift.

**C.3.4** Roundslings should be correctly positioned and attached to the load in a safe manner. Slings should be placed on the load such that they are able to adopt the flattened form and the loading is uniform across their width. They should never be knotted or twisted.

Damage to labels should be prevented by keeping them away from the load, the hook and the angle of choke.

**C.3.5** 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.

**C.3.6** Slings should be protected from edges, friction and abrasion, whether from the load or the lifting appliance. Where 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.

**C.3.7** 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 chock 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 C.1. A double choke hitch provides greater security and helps to prevent the load sliding through the sling.

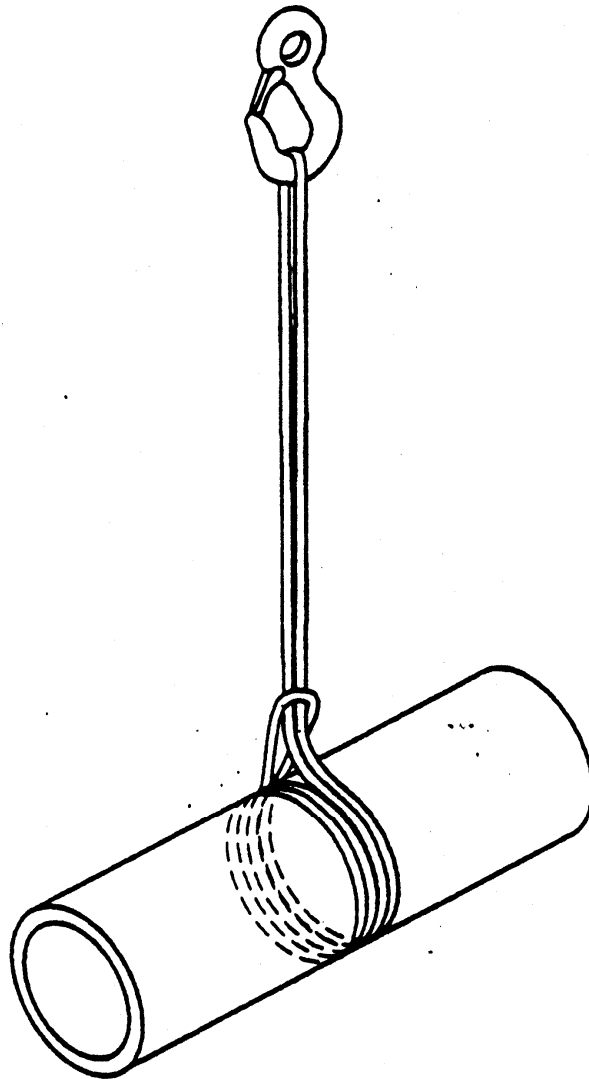


Figure C.1 — Double choke hitch

**C.3.8** 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.

**C.3.9** 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.

**C.3.10** 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.

**C.3.11** 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.

**C.3.12** 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.

**C.3.13** 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.

**C.3.14** 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 C.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.

**C.3.15** Slings which have become wet in use, or as the result of cleaning, should be hung up and allowed to dry naturally.

## **C.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.

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

**Annex ZA**  
(informative)

**Ⓐ 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. Ⓐ

## 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 C.3.8) Cranes – Safe use – Part 1: General