SLOVENSKI STANDARD
SIST EN 13414-3:2004+A1:2009

01-januar-2009

Jeklene vrvne obese - Varnost - 3. del: Zanke in zaključki

Steel wire rope slings - Safety - Part 3: Grommets and cable-laid slings

Anschlagseile aus Strahldrahtseilen - Sicherheit - Teil 3: Grummets und Kabelschlag-Anschlagseile

Elingues en câbles d'acier - Sécurité - Partie 3: Estropes et élingues en grelin

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Ta slovenski standard je istoveten z: **EN 13414-3:2003+A1:2008**

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ICS:

53.020.30	Pribor za dvigalno opremo	Accessories for lifting equipment

SIST EN 13414-3:2004+A1:2009 **en,fr,de**

2003-01.Slovenski inštitut za standardizacijo. Razmnoževanje celote ali delov tega standarda ni dovoljeno.

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EUROPEAN STANDARD

NORME EUROPÉENNE

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EN 13414-3:2003+A1

November 2008

ICS 53.020.30

Supersedes EN 13413-3:2003

English Version

Steel wire rope slings - Safety - Part 3: Grommets and cable-laid slings

Elingues en câbles d'acier - Sécurité - Partie 3: Estropes et élingues en grelin

Anschlagseile aus Strahldrahtseilen - Sicherheit - Teil 3: Grummets und Kabelschlag-Anschlagseile

This European Standard was approved by CEN on 25 March 2003 and includes Corrigendum 1 issued by CEN on 5 May 2004 and Amendment 1 approved by CEN on 18 September 2008.

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This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CEN member into its own language and notified to the CEN Management Centre has the same status as the official versions.

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Foreword

This document (EN 13414-3:2003+A1:2008) has been prepared by Technical Committee CEN/TC 168 “Chains, ropes, webbings, 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of an identical text or by endorsement, at the latest by May 2009, and conflicting national standards shall be withdrawn at the latest by December 2009.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 13414-3:2003.

This document includes Amendment 1, approved by CEN on 2008-09-18 and Corrigendum 1 issued by CEN on 2004-05-05.

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 document 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).

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

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The other parts of this European Standard are:

Part 1 Slings for general lifting service

Part 2 Specification for information for use and maintenance [AC] to 〈AC] be provided by the manufacturer

Annexes A to F are normative. Annex G is informative.

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.

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Introduction

This Part of the standard has been prepared to provide a means of complying with the essential safety requirements of the Machinery Directive and associated EFTA regulations.

Purchasers are advised to specify in their purchasing contract that the supplier operates a quality management system applicable to this standard (e.g. ISO EN 9001) to ensure that products claimed to comply consistently achieve the required level of quality.

The coefficient of utilization (Z_p) used in this standard for slings with a diameter greater than 60 mm is lower than that normally used for general service wire rope slings. This is justified for the following reasons.

a) Slings over 60 mm diameter are not intended for general service and are subjected to special conditions relating to design, construction, frequency of use, service and discard.

b) The mass of the load is generally calculated or measured with considerable accuracy and as such slings are usually specially manufactured for one or a limited number of special lifts.

c) The lifting operation is controlled and supervised.

d) The dynamic factors, e.g. shock loading, are limited.

These factors reduce the unknown aspects which dictate that slings in general service require a higher coefficient of utilization; lower coefficients have been and are used with confidence.

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1 Scope

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This European Standard specifies the construction requirements, calculation of WLL, testing and certification of steel wire rope grommets, cable-laid grommets and cable-laid slings using strand and wire rope conforming to EN 12385-4.

The hazards covered by this standard are identified in clause 4.

This standard covers ferrule-secured cable-laid slings up to 60mm.

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.

EN 292-2:1991/A1:1995*, Safety of machinery – Basic concepts, general principles for design Part 2: Technical principles and specifications (Amendment 1: 1995)*

EN 1050:1996, *Safety of machinery – Principles for risk assessment*

〚AC〛 EN 12385-4:2002 〚AC〛*, Steel wire ropes – Safety – Part 4: Stranded ropes for general lifting applications*

prEN 13411-3, *Terminations for steel wire ropes – Safety – Part 3: Ferrules and ferrule securing*

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3 Terms and Definitions

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

3.1
wire rope grommet
endless wire rope sling made from one continuous length of strand, formed to make a body composed of six strands around a strand core

NOTE The strand ends are tucked into the body forming the core, with the tuck position diametrically opposite to the core butt position.

3.2
cable-laid grommet
endless wire rope sling made from one or two continuous lengths of rope, formed to make a body composed of six ropes around a rope core

NOTE The rope ends are tucked into the body forming the core, with the tuck position(s) diametrically opposite to the core butt position(s).

3.3
cable-laid sling
sling formed from a wire rope constructed of six unit ropes laid as outers over one core unit rope, with a termination at each end, usually in the form of a spliced eye

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3.4
working load limit (WLL)
maximum mass which a sling is authorized to sustain in general service

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3.5
competent person
designated person, suitably trained, qualified by knowledge and practical experience, and in possession of the necessary instructions to enable the required calculation of WLL and examination to be carried out

3.6
nominal diameter of grommet or cable laid sling
dimension by which the sling is designated

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4 Hazards

Accidental release of a load, or release of a load due to failure of a sling or a component puts at risk, either directly or indirectly, the safety or health of those persons within the danger zone.

These aspects of safe use associated with good practice are given in prEN 13414-2.

Table 1 contains all the hazards which require action to reduce risk identified by risk assessment as being specific and significant for slings and their components.

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 13414
1.1.5	Mechanical hazard due to inadequacy of strength	4.1.2.3 4.1.2.5 4.1.2.4 4.3.2	5 and 6 5 and 6 7 7
10.4	Errors of fitting hazard	1.5.4	5

5 Safety requirements and/or measures

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5.1 Grommets

5.1.1 Production of grommets

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During the production of grommets a temporary rigid core shall be used. Grommets and cable-laid ropes shall be produced using a method which ensures that the rope or strand tensions are equalized and that the finished product is free from visible waviness.

5.1.2 Construction of wire rope grommet

The strand used to form the wire rope grommet shall be one of those used to form ropes specified in table 2, 4, 6, 8, 11, 12 and 13 of [AC⟩ EN 12385-4:2002 ⟨AC].

The length of the circumference shall be at least five times the grommet lay length. The core butt position shall be clearly marked by red paint applied over any serving.

5.1.3 Construction of cable-laid grommet

Cable-laid grommets shall be constructed in accordance with A.1. The unit ropes shall be of 6- or 8-strand construction selected from those specified in tables 2, 3, 4, 5, 6, 7, 8, 11, 12 and 13 of [AC⟩ EN 12385-4:2002 ⟨AC]. Ropes over 60 mm diameter shall have steel rope cores.

The length of the circumference shall be at least five times the grommet lay length.

The core butt position shall be clearly marked by red paint applied over any servings.

NOTE The grommet should never be bent at this marked position.

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5.1.4 Length of grommet

The length of a grommet shall be the length of its circumference, measured along its centreline (see fig 1).

For wire rope grommets the tolerance shall be ± 1*d* or 1% of the nominal length whichever is the greater.

For cable-laid grommets constructed from unit ropes with a fibre core of 24mm ≤ *d* ≤ 60mm the tolerance shall be ± 1*d* or 1% of the nominal length whichever is the greater.

For cable-laid grommets constructed from unit ropes with a steel core of 24mm ≤ *d* ≤ 60mm the tolerance shall be ± 1*d* or 1% of the nominal length whichever is the greater.

For cable-laid grommets constructed from unit ropes with a steel core of 66mm ≤ *d* ≤ 696mm the tolerance shall be ± 0,5*d* or 0,5% of the nominal length whichever is the greater.

NOTE Two methods of determination of the length of grommets, either by measuring the distance of the bearing points or, more accurately, by measurement of the circumference are described in annex B.

For the measurement process pin sizes shall conform to annex C.

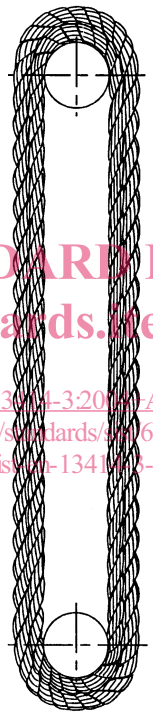

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Figure 1 — Wire rope grommet

5.2 Cable-laid slings

5.2.1 Construction of cable-laid sling

Cable-laid slings shall be constructed in accordance with A.2.

The unit ropes used shall be of 6- or 8-strand construction selected from those specified in tables, 2, 3, 4, 5, 6, 7, 8, 11, 12 and 13 of [AC] EN 12385-4:2002 [AC].

Cable-laid ropes over 60 mm diameter shall have steel rope cores.
If the turn-back loop system for terminations is used, it shall conform to prEN 13411-3. Only unit ropes with a steel core shall be used. Splices shall be made in accordance with annex D.

5.2.2 Length of cable-laid slings

The length, *L*, of a sling, shall be the internal length between the bearing points of each termination whether they are soft eyes, thimbles, or hooks or links, as appropriate (see figure 2).

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NOTE 1 When measuring the actual length of a sling with soft eyes, dimension *w* should be approximately ½*h* (see figure 2) with *h* being approximately 15*d*.

The tolerance of length of ferrule-secured and spliced cable-laid slings shall be ±2*d* or ± 1% of the nominal length, whichever is the greater. This applies for diameters 24mm ≤ d ≤ 696mm.

When measuring length under load, for instance when two or more slings are required to be accurately matched for length, this shall be undertaken at 3 % of the calculated sling breaking force using pins having diameters conforming to Annex C.

NOTE 2 The dimensions of the eye should be selected so that *h* is approximately 15*d*.

5.2.3 Length of matched sets

Where single leg cable-laid slings are intended to be used as matched sets, the difference in length shall not exceed 2*d*.

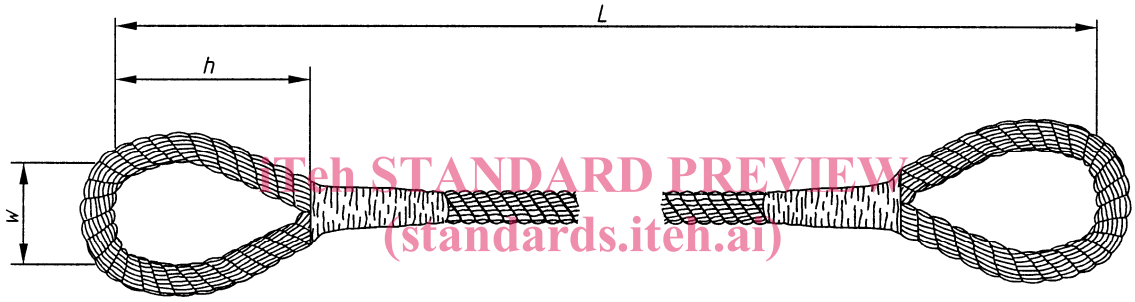

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Figure 2 — Cable-laid sling

5.3 Rating

5.3.1 Grommet rating

The working load limit (WLL) of a wire rope grommet shall be calculated as follows:

$$\mathrm{WLL} = \frac{2F_{\min_2}}{9{,}80665 \times Z_p}$$

The WLL of a cable-laid grommet shall be calculated as follows:

〖AC〗 $$\mathrm{WLL} = \frac{12F_{\min_1} \times k}{9{,}80665 \times Z_p}$$ 〈AC〉

where

$F_{\min_1}$ is the minimum breaking force (in kiloNewtons) of the unit of rope, as specified in EN 12385-4, which is used to form a cable-laid grommet.

$F_{\min_2}$ is the minimum breaking force (in kiloNewtons) of the fibre core rope from which the strand is used to form the wire rope grommet;

NOTE 1 9,806 65 is the constant which converts the force units (kiloNewtons) into the mass units (tonnes) used in lifting operations.

NOTE 2 〖AC〗 *k* 〈AC〉 is a factor which allows for the spinning losses in cabling the ropes. Currently this is taken as 0,9. 〖AC〗 Z_p 〈AC〉 is the coefficient of utilization.

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For grommet rope diameters less than 60 mm, [AC> Z_p <AC] shall be not less than 5.

For grommet rope diameters (d) of 60 mm up to 150 mm, Z_p shall be calculated in accordance with the following equation:

$Z_p = 6{,}33 - 0{,}022\ d$

For grommet rope diameters greater than 150 mm, [AC> Z_p <AC] shall be not less than 3.

5.3.2 Cable-laid sling rating

The WLL of a cable-laid sling shall be calculated as follows:

[AC> $$\mathrm{WLL} = \frac{\sum F_{\min} \times k \times k_T}{9{,}80665 \times Z_p}$$ <AC]

where

ΣF_{min} is the sum of the individual minimum breaking forces of the outer ropes (kiloNewtons), as specified in EN 12385-4.

[AC> k is a factor which allows for the spinning loss in cabling. Currently this is taken as 0,9. <AC]

[AC> K_T is a factor which allows for the efficiency of the termination. <AC]

9,80665 is the constant which converts the force units (kiloNewtons) into the mass units (tonnes) used in lifting operations.

Z_p is the coefficient of utilization.

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For cable-laid sling diameters less than 60 mm, Z_p shall be 5.

For cable-laid sling diameters (d) 60 mm up to 150 mm, Z_p shall be in accordance with the following equation:

$Z_p = 6{,}33 - 0{,}022d$.

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For cable-laid sling diameters greater than 150 mm, [AC> Z_p <AC] shall be not less than 3.

[AC> For the turn-back eye ferrule-secured termination conforming to prEN 13411-3 K_T shall be 0,9 and for spliced terminations K_T shall be 0,8. <AC]