SLOVENSKI STANDARD
SIST EN 13411-5:2004

01-junij-2004

Zaključki jeklenih žičnih vrvi – Varnost – 5. del: Vrvne prižemke oblike U (žabice)

Terminations for steel wire ropes - Safety - Part 5: U-bolt wire rope grips

Endverbindungen für Drahtseile aus Stahldraht - Sicherheit - Teil 5: Drahtseilklemmen mit U-förmigem klemmbügel

Terminaisons pour câbles en acier - Sécurité - Partie 5 : Serre-câbles a étrier en U

Ta slovenski standard je istoveten z: **EN 13411-5:2003**

ICS:

53.020.30	Pribor za dvigalno opremo	Accessories for lifting equipment
77.140.99	Drugi železni in jekleni izdelki	Other iron and steel products

SIST EN 13411-5:2004 **en**

EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

EN 13411-5

May 2003

ICS 21.060.70; 53.020.30

English version

Terminations for steel wire ropes - Safety - Part 5: U-bolt wire rope grips

Terminaisons pour câbles en acier - Sécurité - Partie 5: Serre-câbles pour terminaisons à oeil de câbles en acier

Endverbindungen für Drahtseile aus Stahldraht - Sicherheit - Teil 5: Drahtseilklemmen mit U-förmigem klemmbügel

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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 Management Centre has the same status as the official versions.

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EUROPEAN COMMITTEE FOR STANDARDIZATION
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Ref. No. EN 13411-5:2003 E

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Foreword

This document (EN 13411-5:2003) 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of an identical text or by endorsement, at the latest by November 2003, and conflicting national standards shall be withdrawn at the latest by November 2003.

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 EC Directive(s).

For relationship with EC Directive(s), see informative annex ZA, which is an integral part of this document.

Annexes A and B are informative.

This European Standard also contains a Bibliography.

The other Parts of this European Standard are:

Part 1: Thimbles for steel wire rope slings

Part 2: Splicing of eyes for wire rope slings

Part 3: Ferrules and ferrule-securing

Part 4: Metal and resin socketing

Part 6: Asymmetric wedge socket

Part 7: Symmetric wedge socket

This is the first edition of this Part of this European Standard.

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

Introduction

This European Standard has been prepared to provide a means of conforming with the essential safety requirements of the Machinery Directive and associated EFTA Regulations.

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

1 Scope

This European Standard specifies the minimum requirements for U-bolt wire rope grips manufactured from ferrous materials and the safe behaviour of eye terminations secured by U-bolt wire rope grips for use as intended by the manufacturer.

Suitable uses include suspending static loads and single use lifting operations which have been assessed by a competent person taking into account appropriate safety factors.

U-bolt wire rope grips are not suitable for use with spiral ropes.

This standard does not cover U-bolt wire rope grips as the primary securing devices on mine hoists, crane hoists or eye terminations for slings for general lifting service.

Examples of grips together with fitting instructions are given in informative annexes A and B.

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

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, *Safety of machinery – Basic concepts, general principles for design – Part 2: Technical principles and specifications*

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

EN 1562, *Founding – Malleable cast irons*

EN 12385-1:2002, *Steel wire ropes – Safety – Part 1: General requirements.*

EN 12385-2:2003, *Steel wire ropes – Safety – Part 2: Definitions, designation and classification.*

EN 20898-2, *Mechanical properties of fasteners — Part 2: Nuts with specified proof load values – Coarse thread (ISO 898-2:1992)*

EN ISO 898-1, *Mechanical properties of fasteners made of carbon steel and alloy steel - Part 1: Bolts, screws and studs (ISO 898-1:1999)*

EN ISO 4759-1, *Tolerances for fasteners Part 1: Bolts, screws, studs and nuts - Product grades A, B and C (ISO 4759-1:2000).*

EN ISO 7500-1, *Metallic materials - Verification of static uniaxial testing machines - Part 1: Tension/compression testing machines (ISO 7500-1:1999)*

3 Terms and definitions

For the purposes of this European Standard the terms and definitions given in EN 12385-2:2003 and the following apply:

3.1
U-bolt wire rope grip
U-bolt wire rope grip: assembly consisting of a U-bolt, bridge and nuts that allow for two parts of rope to be pressed together when the nuts are tightened'

3.2
grip-secured eye termination
grip-secured eye termination: eye termination secured by wire rope grips fitted in accordance with the manufacturer's instructions'

4 List of hazards

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

Temperature hazard is not covered as in use temperature is limited by the wire rope.

Table 1 contains those hazards that require action to reduce risk identified by risk assessment as being specific and significant for wire rope grips.

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	Relevant clause/subclause of this standard
1	Mechanical hazard due to inadequacy of strength	1.3.2 4.1.2.3 4.1.2.5 4.2.4 1.7.3 4.3.1 4.2.4	 5 5 6 6
1.7	Puncture hazard	1.3	5
10.4	Errors of fitting hazard	1.5.4	7

5 Safety requirements and/or measures

5.1 Materials

5.1.1 U-bolt

Carbon steel with at least property class 5.8 but not more than property class 8.8 in accordance with EN ISO 898-1.

5.1.2 Bridge

Malleable cast iron grade W40-05 or B35-10 in accordance with EN 1562; or forged non-ageing carbon steel.

5.1.3 Nut

Carbon steel with at least property class 5 in accordance with EN 20898-2 and product grade A in accordance with EN ISO 4759-1.

5.2 Mechanical properties

5.2.1 Grip security/tensile efficiency of grip-secured eye termination

When tested in accordance with 6.2.2 the grip-secured eye termination shall withstand a force of at least 80% of the minimum breaking force of the rope held for 5 minutes without the rope slipping more than 1 mm at the grip-secured eye termination.

5.2.2 Pulsatory fatigue behaviour of grip-secured eye termination

When tested in accordance with 6.2.3 the grip-secured eye termination shall withstand a minimum of 20 000 cycles.

The same grip-secured eye termination subjected to the pulsatory test above shall then be tested in accordance with 6.2.2, after which the grips shall not exhibit any visible cracks, deformation or other damage.

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 testing

6.2.1 General

In order to prove the design, material and method of manufacture, testing shall be carried out on each class of rope for which the grips are designed. The grade of the rope shall be the highest for which the grips are designed.

Where grips are intended for use with single layer ropes with a fibre core and a steel core, testing shall be carried out on both.

At least three assemblies having a grip-secured eye termination at one end shall be tested.

NOTE The number of tests is regarded as two for assemblies having grip-secured eye terminations at both ends.

For both tests described below, the applied force shall be transmitted to the grip-secured eye termination via a round pin(s). The angle subtended by the eye shall not exceed 30°.

The minimum length of free rope between the outer grips for assemblies having grip-secured eye terminations at each end shall be at least 30*d*, where *d* is the nominal rope diameter.

The test machines used in the tests specified in 6.2.2 and 6.2.3 shall conform to EN ISO 7500-1.

Any change of design, specification of material, method of manufacture or any dimension outside normal manufacturing tolerances that may lead to a modification of the mechanical properties shall require that the type testing specified in 6.2.2 and 6.2.3 are carried out on the modified components.

6.2.2 Grip security and tensile test

The test procedure shall generally be in accordance with that described in 6.4.1 of EN 12385-1:2002 except that after a force equivalent to 20 % of the minimum breaking force of the rope has been applied it may be necessary to re-tighten the grips in accordance with the manufacturer's instructions.

The test may be discontinued when the applied force reaches a value equivalent to 80 % of the minimum breaking force of the rope.

6.2.3 Pulsatory fatigue test

Apply a force equivalent to 20 % of the minimum breaking force of the rope and if required by the manufacturer's instructions re-tighten the grips.

Subject each assembly to a cyclic tension along the rope axis of between 15 % and 30 % of the relevant minimum breaking force of the rope. Re-tightening of the grips shall be in accordance with the manufacturer's instructions.

Ensure that the frequency of force application does not exceed 5 Hz.

6.2.4 Acceptance criteria for type tests

If all three assemblies pass all of the above tests, the component of the size submitted for type testing shall be deemed to conform to this part of EN 13411.

If one assembly fails any one of the above tests, two further assemblies shall be tested and both shall pass all of the tests in order for the component of the size submitted for testing to be deemed to conform to this part of EN 13411.

If two or three assemblies fail any one of the above tests, the component of the size submitted for type testing shall be deemed not to conform to this part of EN 13411.

7 Information for use

1.1 Identification marking

The grip size is indicated by the nominal rope diameter(s) for which the grip is intended.

Grips shall be marked permanently by the manufacturer with the grip size and manufacturer's identification.

7.2 Fitting instructions

The manufacturer of the grips shall provide fitting instructions which shall include advice on the diameter, class and grade of rope for which each grip is suitable, the number, material and dimensions of grips to be used, their spacing and orientation and the required torque value.

The manufacturer's instructions shall include information on the following:

a) temperature range for use;

b) greasing of screw threads and any other surfaces;

c) re-tightening and the subsequent frequency of re-tightening.

7.3 Certificate

The manufacturer or supplier shall, on request, provide a certificate giving the following information:

a) a statement of conformance to this European Standard;

b) name and address of manufacturer;

c) nominal size of wire rope grip (rope diameter);

d) a means of referencing the certificate to the wire rope grip.

Annex A
(informative)

Specification for construction and sizes for one design of grip - 1

A.1 General

This annex specifies the materials, dimensions and construction requirements for one design of wire rope grip, suitable for rope grades up to and including 1960, which meets the performance requirements of this standard.

A.2 Material

A.2.1 U-bolt

The material, finish and testing of the U-bolt are to be as follows:

Property class 6.8 in accordance with EN ISO 898-1.

Finish in accordance with EN ISO 4042, zinc electroplated and yellow chromatized.

Testing in accordance with EN ISO 898-1.

A.2.2 Bridge

The material, finish and testing of the bridge are to be as follows:

Malleable cast iron grade W40-05 or B35-10 in accordance with ISO 5922.

Finish in accordance with EN ISO 4042 zinc electroplated and chromatized.

Testing in accordance with EN 1562.

A.2.3 Collar nut

The material, finish and testing of the collar nut are to be as follows:

Property class 6 in accordance with EN 20898-2.

Product grade 'A' in accordance with EN ISO 4759-1.

Finish in accordance with EN ISO 4042 zinc electroplated and yellow chromatized.

Testing in accordance with EN 20898-2.