SLOVENSKI STANDARD
oSIST prEN 13411-7:2018

01-december-2018

Zaključki jeklenih žičnih vrvi - Varnost - 7. del: Simetrični zagozdni spoji

Terminations for steel wire ropes - Safety - Part 7: Symmetric wedge socket

Endverbindungen für Drahtseile aus Stahldraht - Sicherheit - Teil 7: Symmetrische Seilschlösser

Terminaisons pour câbles en acier - Sécurité - Partie 7: Boîte à coin symétrique

Ta slovenski standard je istoveten z: **prEN 13411-7**

ICS:

21.060.70	Sponke in skobe	Clamps and staples
53.020.30	Pribor za dvigalno opremo	Accessories for lifting equipment

oSIST prEN 13411-7:2018 **en,fr,de**

EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

DRAFT
prEN 13411-7

October 2018

ICS 21.060.70; 53.020.30

Will supersede EN 13411-7:2006+A1:2008

English Version

Terminations for steel wire ropes - Safety - Part 7: Symmetric wedge socket

Terminaisons pour câbles en acier - Sécurité - Partie 7: Boîte à coin symétrique

Endverbindungen für Drahtseile aus Stahldraht - Sicherheit - Teil 7: Symmetrische Seilschlösser

This draft European Standard is submitted to CEN members for enquiry. It has been drawn up by the Technical Committee CEN/TC 168.

If this draft becomes a European Standard, CEN members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration.

This draft European Standard was established by CEN 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-CENELEC Management Centre has the same status as the official versions.

CEN members are the national standards bodies of Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, Former Yugoslav Republic of Macedonia, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and United Kingdom.

Recipients of this draft are invited to submit, with their comments, notification of any relevant patent rights of which they are aware and to provide supporting documentation.

Warning : This document is not a European Standard. It is distributed for review and comments. It is subject to change without notice and shall not be referred to as a European Standard.

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

CEN-CENELEC Management Centre: Rue de la Science 23, B-1040 Brussels

Contents

Page

European foreword

This document (prEN 13411-7:2018) 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 document is currently submitted to the CEN Enquiry.

This document will supersede EN 13411-7:2006+A1:2008.

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).

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

EN 13411 consists of the following parts:

- Part 1: Thimbles for steel wire rope slings
- Part 2: Splicing of eyes for steel wire rope slings
- Part 3: Ferrules and ferrule-securing
- Part 4: Metal and resin socketing
- Part 5: U-bolt wire rope grips
- Part 6: Asymmetric wedge socket
- Part 7: Symmetric wedge socket

Introduction

This European Standard is a type C standard as stated in EN ISO 12100.

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

The wedge socket concerned and the extent to which hazards, hazardous situations and events are covered are indicated in the scope of this standard part of the standard.

When provisions of this type C standard are different from those which are stated in type A or B standards, the provisions of this type C standard take precedence over the provisions of the other standards for symmetric wedge sockets that have been designed and produced according to the provisions of this type C standard.

Purchasers ordering to this standards 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 assure themselves that products claiming to comply consistently achieve the required level of quality.

1 Scope

This document specifies the minimum requirements for symmetrical wedge socket terminations for stranded steel wire ropes conforming to prEN 12385-5 for lifts.

This document covers those symmetric wedge sockets intended for use at temperatures between -20 °C and 100 °C.

This document only covers those symmetric wedge sockets that have welded socket bodies. An example of the construction and sizes of a symmetric wedge socket is given in informative Annex A.

The informative Annex B gives the recommendations for the safe use and inspection of symmetric wedge socket according to Annex A.

This document deals with all significant hazards, hazardous situations and events relevant to symmetric wedge sockets for terminations for steel wire ropes, when used as intended and under conditions of misuse which are reasonably foreseeable by the manufacturer.

The hazards covered by this European Standard are identified in Clause 4.

This document applies to symmetric wedge sockets, which are manufactured after the date of its publication.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

EN 1561:2011, *Founding — Grey cast irons*

EN 1562:2012, *Founding — Malleable cast irons*

EN 10025-2:2004, *Hot rolled products of structural steels — Part 2: Technical delivery conditions for non-alloy structural steels*

EN 12385-2:2002+A1:2008, *Steel wire ropes — Safety — Part 2: Definitions, designation and classification*

prEN 12385-5:2018, *Steel wire ropes — Safety — Part 5: Stranded ropes for lifts*

EN ISO 148-1:2016, *Metallic materials — Charpy pendulum impact test — Part 1: Test method (ISO 148-1:2016)*

EN ISO 4063:2010, *Welding and allied processes — Nomenclature of processes and reference numbers (ISO 4063:2009, Corrected version 2010-03-01)*

EN ISO 5817:2014, *Welding — Fusion-welded joints in steel, nickel, titanium and their alloys (beam welding excluded) — Quality levels for imperfections (ISO 5817:2014)*

EN ISO 683-1:2018, *Heat-treatable steels, alloy steels and free-cutting steels — Part 1: Non-alloy steels for quenching and tempering (ISO 683-1:2016)*

EN ISO 683-2:2018, *Heat-treatable steels, alloy steels and free-cutting steels — Part 2: Alloy steels for quenching and tempering (ISO 683-2:2016)*

EN ISO 7500-1:2018, *Metallic materials — Calibration and verification of static uniaxial testing machines — Part 1: Tension/compression testing machines — Calibration and verification of the force-measuring system (ISO 7500-1:2018)*

EN ISO 12100:2010, *Safety of machinery — General principles for design — Risk assessment and risk reduction (ISO 12100:2010)*

EN ISO 17638:2016, *Non-destructive testing of welds — Magnetic particle testing (ISO 17638:2016)*

EN ISO 23277:2015, *Non-destructive testing of welds — Penetrant testing — Acceptance levels (ISO 23277:2015)*

3 Terms and definitions

For the purposes of this document, the following terms and definitions given in EN ISO 12100:2010, EN 12385-2 and the following apply.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

- IEC Electropedia: available at http://www.electropedia.org/
- ISO Online browsing platform: available at http://www.iso.org/obp

3.1
symmetric wedge socket
assembly consisting of a socket body, wedge, and pin and securing means for the pin; when assembled the centre line of the pin is marginally offset (by one half rope diameter, see Figure B.1) to the longitudinal axis of the live portion of the rope

3.2
socket body
principal component of a wedge socket termination having an internal tapered form suitable for receiving a wedge (see 3.3) and the rope with which the wedge is associated, see Figure A.1

3.3
wedge
flat tapered component with peripheral groove, suitable for fitting into a tapered socket body to accommodate a rope of matching nominal diameter, see Figure A.1

3.4
pin
removable component intended to facilitate connection of the socket body to its anchorage point

3.5
lot
number of symmetric wedge sockets from which samples are selected for testing purposes which are of the same type and dimension, each of their constituent components manufactured during the same production run from material of the same cast and subjected to the same heat treatment process

4 List of significant hazards

This European Standard contains all the significant hazards, hazardous situations and events, as far as they are dealt with in this European Standard, identified by risk assessment as significant for this type of steel wire rope termination that require action to eliminate or reduce the risk.

In particular, the hazard caused by accidental release of a load, or release of a load due to failure of a symmetric wedge socket, puts at risk, either directly or indirectly, the safety or health of those persons within the hazard zone.

Errors in the fitting of accessories can also lead to premature failure and this European Standard contains dimensional and geometrical requirements to allow correct fit.

Table 1 contains those hazards that require action to reduce risk identified by risk assessment as being specific and significant for symmetric wedge sockets.

Table 1 — Hazards and associated requirements

Hazards relevant to this standard identified by reference to EN ISO 12100:2010	Relevant clause of this standard
Inadequate mechanical strength	5.1 5.3 Clause 6
Errors of fitting	5.1 7.2
Insecurity of components	5.2
Failure arising from fatigue	5.4.3 6.2.3
Inadequate low temperature properties	5.4.4 6.2.5
Incorrect identification of components	7.1 7.2
Inadequate information about the item	7.3

5 Safety requirements and/or measures

5.1 Geometry of wedge and socket body

Symmetric wedge socket terminations for ropes shall conform to the following geometrical criteria (see Figure A.1):

- the wedge groove angle (α) shall be the same as the socket angle in the body (β);
- the wedge shall be symmetric;
- the internal side surfaces of the socket body and the wedge in contact with the rope shall be straight;
- the grooves of the body and the wedge shall have no surface irregularities, such as, protrusions or joints which could influence the intimate contact with the rope;

- the clamping length between the socket body and the wedge shall be at least 7,3 times the nominal rope diameter *d*;
- the radius r_3 of the wedge at the bottom of the groove at the large end shall be at least 1 times the nominal diameter *d* of the rope.

5.2 Security of the pin

The pin shall be provided with a means for securing it in position when in operation.

5.3 Welded socket body

The welding and allied process shall conform to one of those specified in EN ISO 4063. The person who supervises the production process shall be trained in the chosen welding process.

The quality of the welding joint shall be in accordance with assessment group B of EN ISO 5817. There shall be no melted-on weld chips.

The ligament distance in the root of the welding joint shall be 1 mm for material thickness up to 6 mm and 1,5 mm for material thickness more than 6 mm up to and including 12 mm. The penetration of the root of the welding shall be avoided. There shall be no increase of the welding joint in the area of contact with the rope. The welding joint shall have a bonding area of at least 70 % at the joint edge.

Any offset of the edges of the body halves shall be limited to 0,5 mm for material thickness up to 6 mm and 0,8 mm for material thickness more than 6 mm up to and including 12 mm.

5.4 Mechanical properties

5.4.1 General

The required mechanical properties take into account that symmetric wedge sockets in combination with stranded ropes for lifts to prEN 12385-5 have to be used with a minimum coefficient of use of 5 for lifting goods and 10 for lifting of persons.

5.4.2 Termination efficiency

When tested in accordance with 6.2.2, the efficiency of the assembled termination shall be at least 80 % of the minimum breaking force of the rope without any movement between the rope and the termination and any deformation of the wedge and the socket.

5.4.3 Fatigue behaviour of the socket body and pin

When tested in accordance with 6.2.3 the socket body, wedge and pin shall not exhibit any indications of cracks after 75 000 load cycles.

The socket and wedge shall also exhibit no sign of local permanent deformation.

5.4.4 Low temperature properties

The material of the socket body and pin, when tested in accordance to 6.2.4 shall possess a minimum low temperature ductility at –20 °C as follows:

Minimum average Charpy impact value at 27 J, with no individual value less than 18 J.

6 Verification of safety requirements

6.1 Qualifications of personnel

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

6.2 Type testing

6.2.1 General

Two type tests shall be carried out for each requirement, in accordance with 6.2.2 to 6.2.3 on assembled terminations of each design, material and method of manufacture, using the highest minimum breaking force of rope as defined in prEN 12385-5 for which the socket is designed.

If the dimensional criteria, the material or the method of manufacture are subsequently varied outside the usual manufacturing tolerances, the type tests shall be repeated.

The testing machine shall conform to the requirements of EN ISO 7500-1.

6.2.2 Tensile efficiency test

Subject the assembled termination to an initial load of 60 % of the minimum breaking force of the rope, then increase the loading at a rate of not more than 0,5 % of the breaking force per second in the tensile testing machine. The test shall be continued until either rope breaks or slips out of the socket.

If terminations are tested in pairs, the distance between the inner faces of the socket bodies shall be at least 30d.

6.2.3 Fatigue test

The test shall be carried out on an in-line tensile fatigue machine. The termination shall not be allowed to rotate and the test shall consist of the application of the cycle force from 15 % to 30 % of the minimum breaking force of the rope along the rope axis for 75 000 cycles.

The frequency of the force shall not exceed 5 Hz.

The component parts shall be subject to dye penetrant in accordance with EN ISO 23277 or magnetic particle inspection in accordance with EN ISO 17638, both before and after the fatigue test to enable any crack propagation as a result of fatigue to be readily identified.

NOTE More than one rope may be required to enable the socket body to achieve 75 000 cycles.

6.2.4 Acceptance criteria for type testing

If the assemblies pass all of the above tests, the symmetric wedge socket of the size submitted for type testing shall be deemed to conform to this European Standard.

Should one sample fail these tests, and on examination it is found due to a material defect in the socket body or pin, the manufacturing process shall be re-examined and amended to eliminate such defects, after which a further two assemblies of the same size, design and material content shall be tested. If these pass the above tests, the symmetric wedge socket of the size submitted for type testing shall be deemed to conform to this European Standard.

If one or both fail the re-test, the symmetric wedge socket of the size submitted for type testing shall be deemed not to conform to this European Standard.