SLOVENSKI STANDARD
SIST EN 13411-7:2021

01-september-2021

Nadomešča:
SIST EN 13411-7:2006+A1:2008

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: **EN 13411-7:2021**

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 13411-7:2021 **en,fr,de**

EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

EN 13411-7

July 2021

ICS 21.060.70; 53.020.30; C

Supersedes 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

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This European Standard was approved by CEN on 28 April 2021.

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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-CENELEC Management Centre has the same status as the official versions.

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

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European foreword

This document (EN 13411-7:2021) 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of an identical text or by endorsement, at the latest by January 2022, and conflicting national standards shall be withdrawn at the latest by January 2022.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN shall not be held responsible for identifying any or all such patent rights.

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

The main changes compared to the previous edition are listed below:

— a major change to 6.4;

— updates to standard references;

— coefficient of utilisation changed from 10:1 to 12:1 for lifting persons – 5.4.1.

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;

— Part 8: Swage terminals and swaging;

— Part 9: Solid thimbles.

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

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

EN 12385-5:2021, *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 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 https://www.electropedia.org/

— ISO Online browsing platform: available at https://www.iso.org/obp

3.1
symmetric wedge socket
assembly consisting of a socket body, wedge, and a pin marginally offset to the longitudinal axis of the live portion of the rope, and securing means for the pin

Note 1 to entry: See Figure B.1.

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

Note 1 to entry: 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

Note 1 to entry: 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:

— 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 of the wedge at the bottom of the groove at the large end of the wedge 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 EN 12385-5 have to be used with a minimum coefficient of use of 5 for lifting goods and 12 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 6.2.5 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.