

# Terminations for steel wire ropes — Safety —

## Part 7: Symmetric wedge socket

ICS 21.060.70; 53.020.30

## National foreword

This British Standard is the UK implementation of EN 13411-7:2006+A1:2008. It supersedes BS EN 13411-7:2006 which is withdrawn.

The start and finish of text introduced or altered by amendment is indicated in the text by tags. Tags indicating changes to CEN text carry the number of the CEN amendment. For example, text altered by CEN amendment A1 is indicated by A1 A1.

The UK participation in its preparation was entrusted to Technical Committee MHE/2, Wire ropes.

A list of organizations represented on this committee can be obtained on request to its secretary.

This publication does not purport to include all the necessary provisions of a contract. Users are responsible for its correct application.

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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 European Standard was approved by CEN on 10 May 2006 and includes Amendment 1 approved by CEN on 18 September 2008.

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

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## Foreword

This document (EN 13411-7:2006+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of an identical text or by endorsement, at the latest by April 2009, and conflicting national standards shall be withdrawn at the latest by December 2009.

This document supersedes EN 13411-7:2006.

This document includes Amendment 1, approved by CEN on 2008-09-18.

The start and finish of text introduced or altered by amendment is indicated in the text by tags  $\boxed{A_1}$   $\boxed{A_1}$ .

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).

$\boxed{A_1}$  For relationship with EU Directive(s), see informative Annexes ZA, ZB and ZC, which are integral parts of this document.  $\boxed{A_1}$

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

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 is a type C standard as stated in EN 12100.

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 ensure themselves that products claiming to comply consistently achieve the required level of quality.

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## 1 Scope

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

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

This European Standard 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 European Standard 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 reasonable foreseeable by the manufacturer.

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

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

## 2 Normative references

The following referenced documents are indispensable for the application 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 1050:1996, *Safety of machinery — Principles for risk assessment*

EN 1289:1998, *Non-destructive testing of welds — Penetrant testing of welds — Acceptance levels*

EN 1290:1998, *Non-destructive examination of welds — Magnetic particle examination of welds*

EN 10045-1, *Metallic materials — Charpy impact test — Part 1: Test method*

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

EN 12385-5:2002, *Steel wire ropes — Safety — Part 5: Stranded ropes for lifts*

EN ISO 4063, *Welding and allied processes - Nomenclature of processes and reference numbers (ISO 4063:1998)*

EN ISO 5817, *Welding — Fusion-welded joints in steel, nickel, titanium and their alloys (beam welding excluded) — Quality levels for imperfections (ISO 5817:2003)*

EN ISO 7500-1:2004, *Metallic materials — Verification of static uniaxial testing machines — Part 1: Tension/compression testing machines — Verification and calibration of the force-measuring system (ISO 7500-1:2004)*

EN ISO 12100-1:2003, *Safety of machinery — Basic concepts, general principles for design — Part 1: Basic terminology, methodology (ISO 12100-1:2003)*

EN ISO 12100-2:2003, *Safety of machinery — Basic concepts, general principles for design — Part 2: Technical principles (ISO 12100-2:2003)*

### **3 Terms and definitions**

For the purposes of this document, the terms and definitions given in EN ISO 12100-1:2003, EN ISO 12100-2:2003, EN 12385-2:2002 and the following apply.

**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 identified in Annex A of EN 1050:1996		Relevant clause of this Part of EN 13411
1.1.5	Mechanical hazard due to inadequacy of strength	5 6 7
1.3	Cutting or shearing hazard	7
15	Errors of fitting	7

## 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 ( $\alpha$ ) shall be the same as the socket angle in the body ( $\beta$ );
- 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 5817:2003. 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 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  $-20\text{ }^{\circ}\text{C}$  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 competent person.

### **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 EN 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 1289 or magnetic particle inspection in accordance with EN 1290, 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.

### 6.2.5 Charpy impact test

Charpy V-notch impact test shall be carried out in accordance with EN 10045-1 on material of socket bodies and pins of all sizes. Three samples shall be tested at a temperature of  $-20^{\circ}\text{C}$ .

If one of the three sample of the Charpy impact test fails the individual value test or the three samples fail the average value test two further samples shall be taken and both shall pass the individual value test and the average of the five samples shall pass the average test in order for the respective component of size submitted for type testing to be deemed to conform to this European Standard.

If two or three samples fail the individual value test, the respective component of the size submitted for type testing shall be deemed not to conform to this European Standard.

## 6.3 Manufacturing tests and examination

### 6.3.1 Manufacturers tests

Socket body and pin shall be subjected to the manufacturing proof force equal to a load of 40 % of the highest minimum breaking force of rope for which the socket is designed. This shall be sustained without deviating from the dimensions of the manufacturer's drawings, and without visible defect after removal of the load.

### **6.3.2 Visual examination of welded socket bodies**

#### **6.3.2.1 Welded socket bodies**

The socket body shall be subjected to visual examination by a competent person. The visual examination shall cover at least the following features:

- faults, including flaws, cracks and 'melted-on' weld chips, arising from the manufacturing process,
- penetration of the root of the welding seam;
- the ligament;
- faults arising from the surface finish or the finishing process and
- indications which might be cracks.

Any surface defect that breaks the edge of the pin hole shall result in the socket being rejected.

#### **6.3.2.2 Wedges and pins**

The visual examination shall cover at least the following features:

- faults arising from the machinery process;
- distortion and/or cracks arising from the heat treatment process;
- faults arising from the surface finish or finishing process;
- any indications which might be cracks;
- any surface defect that breaks the edge of the pinhole shall result in the socket being rejected.

### **6.3.3 Weld testing**

The welding parameters are to be documented for the adopted welding process.

A breaking test shall be done for every charge of material for testing the welding parameters and for judging the quality of the weld. Alternatively a macro grinding per weld and an objective irradiation with the x-ray tube can be run through for error finding for each charge of material.

Linkage area on the joint flanks is to be at least 70 %.

## **6.4 Manufacturing test and examination regime and acceptance criteria**

### **6.4.1 General**

The manufacturing test and examination regime shall depend on whether the manufacturer has a quality assurance system which conforms to EN ISO 9001 and is certified by a certification body accredited to EN 45012. If such a system is in place and operating the manufacturer shall comply with 6.4.2. If no such system is in place or operating the manufacturer shall comply with 6.4.3.

### **6.4.2 Quality system conforming to EN ISO 9001 is in place and operating**

The manufacturer shall visually examine all termination in accordance with 6.3.2 plus apply a manufacturing proof force according to his quality assurance system.

The manufacturer shall also carry out a weld test on 1 (one) piece of the lot of the socket bodies in accordance with 6.3.3.

If one sample fails the weld test or the tensile efficiency test two further samples shall be taken and tested from the same lot.

If one or both of these samples fail to meet the appropriate requirements, the entire lot shall be deemed not to conform to this European Standard.

#### 6.4.3 Quality system conforming to EN ISO 9001 is not in place and not operating

The manufacturer shall visually examine all termination in accordance with 6.3.2 plus apply a manufacturing proof force to 3 % of the lot of socket bodies and pins in accordance with 6.3.1.

The manufacturer shall also carry out a weld test on 1 (one) piece of the lot of the socketed bodies in accordance with 6.3.3.

The manufacturer shall also subject three samples of socket body and pin per lot to the tensile efficiency test as described in 6.2.2.

If the sample fails the weld test or one of the samples fails the tensile efficiency test, two further samples shall be taken from the same lot and tested.

If one or both of these samples fail the weld test or the tensile efficiency test, the entire lot shall be deemed not to conform to this European Standard.

## 7 Information for use

### 7.1 Marking

As an aid to correct matching of component parts, they shall be marked with raised or indented lettering in accordance with Table 2.

Table 2 — Marking of components

Component	Marking
Socket body	Manufacturer's mark Nominal size or size range
Wedge	Nominal size or size range
Pin	Manufacturer's mark <sup>a</sup>
<sup>a</sup> Where pins can be interchanged between sizes of socket for a given manufacture, they should also be marked with the size or size range.	

### 7.2 Fitting instructions

The manufacturer of the socket body shall provide fitting instructions that shall include advice on the diameter, class and grade of rope for which the socket is designed, method of assembly, inspection in use and re-terminating if the rope is shortened.

The manufacturer's instructions shall include information on the temperature range of use.

NOTE Recommendations for safe use and inspection of symmetric wedge socket conforming to Annex A are given for information in Annex B.

### **7.3 Manufacturer's certificate**

The manufacturer shall supply a certificate with each symmetric wedge socket termination or batch of symmetric wedge socket terminations stating the following:

- a) name and address of the manufacturer  $\text{A}_1$  or where applicable the authorized representative  $\text{A}_1$ ;
- b) description and nominal size or size range;
- c) that the terminations are identical, within manufacturing tolerances, with those that have passed the type tests;
- d) that the terminations conform to this European Standard;
- e) size of pin for which the socket is designed if the socket is supplied without a pin and
- f) details for which type of ropes the termination is suitable (e.g. stranded steel wire ropes for lifts as defined in EN 12385-5).

## Annex A (informative)

### Construction and sizes for one design of symmetric wedge socket with welded socket body

#### A.1 General

This annex states materials, dimensions and construction requirements for one design of symmetrical wedge socket that meets the requirements of this European Standard. It applies for terminations suitable for steel wire ropes for lifts as defined in EN 12385-5.

#### A.2 Material

Material of the body: S 235 J2 according to EN 10025-2

Material of the wedge: EN-GJMW-400-5 according to EN 1562 or EN-GJL-200 according to EN 1561

Material of the pin: C 35 E according to EN 10083-1

#### A.3 Dimensions

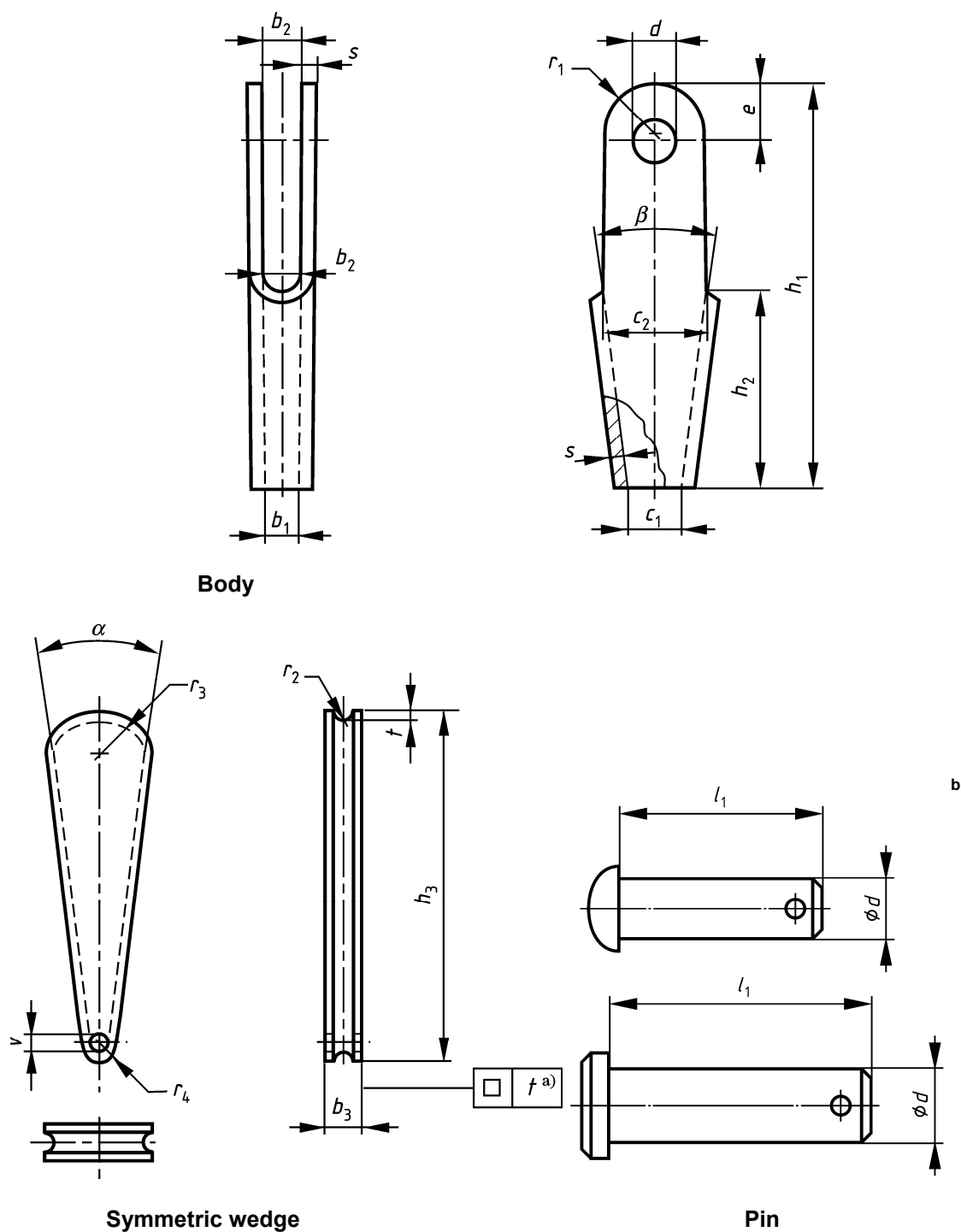
Dimensions, in millimetres, are to be in accordance with Figure A.1 and Table A.1.

Degree of accuracy: DIN 6930-2 - m

GTA 17 DIN 1684-1

The wedge angle ( $\alpha$ ) is to be  $(13 - 0,5/+1)^\circ$ .

The socket angle ( $\beta$ ) is to be  $(13 - 0,5/+1)^\circ$ .



<sup>a</sup> The flatness tolerance  $t$  equates with the positive tolerance of dimensions.

<sup>b</sup> Pins may vary to customers design.

**Figure A.1 — Body, wedge and pin details for one design of symmetric wedge socket**



Table A.1 — Dimensions in mm for one design of symmetric wedge socket with welded socket body (see Figures 1 and A.1)

Nominal Size mm	Suitable for nominal rope diameter	Body														Mass kg
		$b_1$		$b_2$		$c_1$		$c_2$		$d$	$e$	$h_1$	$h_2$	$r_1$	$s$	
5	4 to 5	9	$\begin{smallmatrix} +1 \\ 0 \end{smallmatrix}$	12	$\begin{smallmatrix} +1 \\ 0 \end{smallmatrix}$	13	$\begin{smallmatrix} +1 \\ 0 \end{smallmatrix}$	26	$\begin{smallmatrix} +1 \\ 0 \end{smallmatrix}$	10	14	110	55	12	3	0,14
6,5	5 to 6,5	9	$\begin{smallmatrix} +1 \\ 0 \end{smallmatrix}$	10	$\begin{smallmatrix} +1 \\ 0 \end{smallmatrix}$	16	$\begin{smallmatrix} +1 \\ 0 \end{smallmatrix}$	28	$\begin{smallmatrix} +1 \\ 0 \end{smallmatrix}$	10	15	100	48	14	4	0,19
8	6 to 8	12	$\begin{smallmatrix} +1 \\ 0 \end{smallmatrix}$	14	$\begin{smallmatrix} +1 \\ 0 \end{smallmatrix}$	20	$\begin{smallmatrix} +1 \\ 0 \end{smallmatrix}$	37	$\begin{smallmatrix} +1 \\ 0 \end{smallmatrix}$	12	20	150	75	18	4	0,36
11	9 to 11	15	$\begin{smallmatrix} +1 \\ 0 \end{smallmatrix}$	17	$\begin{smallmatrix} +1 \\ 0 \end{smallmatrix}$	26	$\begin{smallmatrix} +1 \\ 0 \end{smallmatrix}$	48	$\begin{smallmatrix} +1 \\ 0 \end{smallmatrix}$	16	26	190	95	23	6	0,85
14	12 to 14	20	$\begin{smallmatrix} +1 \\ 0 \end{smallmatrix}$	22	$\begin{smallmatrix} +1 \\ 0 \end{smallmatrix}$	32	$\begin{smallmatrix} +1 \\ 0 \end{smallmatrix}$	58	$\begin{smallmatrix} +1 \\ 0 \end{smallmatrix}$	18	32	230	115	28	8	1,70
17	15 to 17	23	$\begin{smallmatrix} +1,5 \\ 0 \end{smallmatrix}$	25	$\begin{smallmatrix} +1,5 \\ 0 \end{smallmatrix}$	40	$\begin{smallmatrix} +1,5 \\ 0 \end{smallmatrix}$	70	$\begin{smallmatrix} +1,5 \\ 0 \end{smallmatrix}$	22	36	260	130	32	10	2,99
20	18 to 20	26	$\begin{smallmatrix} +1,5 \\ 0 \end{smallmatrix}$	27	$\begin{smallmatrix} +1,5 \\ 0 \end{smallmatrix}$	48	$\begin{smallmatrix} +1,5 \\ 0 \end{smallmatrix}$	82	$\begin{smallmatrix} +1,5 \\ 0 \end{smallmatrix}$	25	40	300	150	35	12	4,58

Nominal Size mm	Suitable for nominal rope diameter	Wedge										Pin	
		$b_3$		$r_2$	$r_3$	$r_4$	$h_3$	$t$	$v$	Mass kg	Split pin	$d$	$l_1$
5	4 to 5	8	$\begin{smallmatrix} 0 \\ -1 \end{smallmatrix}$	2,5	9,5	3	68	1,5	-	0,050	3,2 x 32	10	28
6,5	5 to 6,5	8	$\begin{smallmatrix} 0 \\ -1 \end{smallmatrix}$	3,25	9	3,5	58	1,5	-	0,033	3,2 x 32	10	28
8	6 to 8	11	$\begin{smallmatrix} 0 \\ -1 \end{smallmatrix}$	4	12,5	4	92	2	2	0,098	3,2 x 32	12	33
11	9 to 11	14	$\begin{smallmatrix} 0 \\ -1 \end{smallmatrix}$	5,5	16	5	117	3	-	0,191	3,2 x 32	16	45
14	12 to 14	18	$\begin{smallmatrix} 0 \\ -1 \end{smallmatrix}$	7	19	6	141	4	-	0,380	3,2 x 32	18	55
17	15 to 17	21	$\begin{smallmatrix} 0 \\ -1 \end{smallmatrix}$	8,5	23	8	162	5	3,2	0,570	3,2 x 32	22	66
20	18 to 20	24	$\begin{smallmatrix} 0 \\ -1 \end{smallmatrix}$	10	26	9	186	5	-	0,900	3,2 x 32	25	75

NOTE The small end of the wedge may be rounded to  $r_4$  or be straight.

## Annex B (informative)

### Recommendations for safe use and inspection of symmetric wedge sockets conforming to Annex A, to be provided by the manufacturer

#### B.1 General

This annex gives recommendations for safe usage and inspection of symmetric wedge socket terminations.

#### B.2 Method of assembly

**B.2.1** The correct marking including nominal size or range of sizes of the body, the wedge and the pin should be checked. Prior to assembly the socket body and the pin should be examined to ensure they are free from defect, that will effect the performance of the assembly.

**B.2.2** It is essential to use only a wedge and a socket body of the correct dimensions and strength for the particular steel wire rope. Failure to do so may result in the rope pulling through the wedge socket, or the failure of the rope or of the termination. No attempt should be made to modify the socket body or wedge in any way.

**B.2.3** Socket bodies and wedges from different manufacturers should not be assembled together, even though they may be designed for the same size of rope. Components of different designs should not be mixed and the manufacturer's marks and the fit of the wedge (with the rope) in the socket body should always be checked at the time of the assembly.

An oversize wedge, or a wedge of incorrect taper, will not enter the socket body sufficiently to give a secure termination; a too small wedge will protrude too far through the socket body and the high localised loading may cause the socket body to crack and open out, allowing the wedge to pull through.

To reduce the risk of confusion of a body and wedge of different sizes or manufacture, the socket body, pin and wedge should be secured together during storage and transport of the termination.

**B.2.4** When a rope is to be re-terminated with a wedge socket termination this can only be achieved by shortening the rope and re-socketing in a new position.

No part of any previous flattening and/or damaged rope should be on the standing part of the rope or within the clamping area between either side of the socket body and the wedge.

**B.2.5** The rope should be fitted so that the standing part is not kinked where it leaves the socket body but pulls directly in line with the point of attachment of the socket. Incorrect fitting will result in premature failure of the rope.

**B.2.6** When the termination is made up, the tail-end of the rope left protruding should be long enough for the securing method to be used, see Figure B.1.

**B.2.7** After a termination has been made or re-made, it is essential that the wedge and the rope are properly seated in the socket body before being put into service. Failure to do so may allow the rope to pull through the fitting or, particularly when the rope is new, the wedge may be sprung out of the socket body.

**B.2.8** The wedge should be hammered home using a wooden packer to protect the fitting and rope against damage. The wedge should be properly seated before the assembly is put into service.

**B.2.9** Special care is necessary when tension may be completely removed from the rope and where there is a possibility that the wedge may become loosened.

**B.2.10** The pin should be secured in such a way that it cannot move from its position during operation.

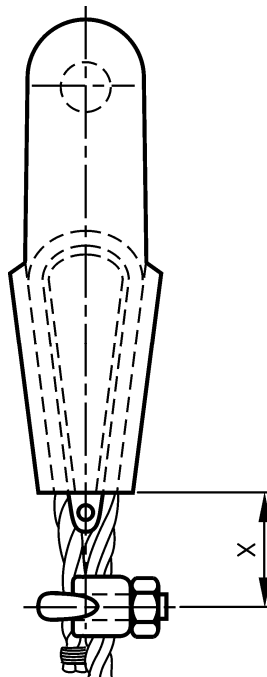
### B.3 Inspection in use

**B.3.1** Wedge socket terminations should be inspected at the time of rope inspection.

**B.3.2** Particular attention should be paid to the following:

- a) rope damage, e.g. broken wires, or deformation of the rope where it emerges from the socket body;
- b) the conditions of the socket body, e.g. cracks, particularly if the wedge is seen to protrude excessively. The lugs of the socket body should be examined for possible deformation, cracks or other defects;
- c) the security and tightness of the wedge fitting;
- d) condition of the pin including any screw thread and the presence of the split cotter pin correctly positioned and locked in.

**B.3.3** The socket body and the wedge and the part of the rope lying inside the fitting should be examined each time the assembly is dismantled for any reason. If a wedge or socket body is found to be damaged, then the whole termination should be replaced.



**Figure B.1 — Method of dealing with the rope tail-end**

**NOTE** The measurement X in Figure B.1, the distance of the grip from the nearest part of the socket body should be no more than 40 % of the overall length of the wedge, in order to avoid deforming the rope (if the distance is too small) or prevent the wedge from falling clear of the socket body (if the rope becomes slack and the distance is too great).

## Annex ZA (informative)

### Relationship between this European Standard and the Essential Requirements of EU Directive 95/16/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 Lift Directive 95/16/EC.

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.

**Table ZA.1 — Correspondence between this European Standard and Directives 95/16/EC**

Clause(s) / subclause(s) of this EN	Essential Requirements (ER's) of the Directive 95/16/EC	Qualifying remarks / notes
5; 6; 7.2	1.3	Minimize the risk of car falling maintenance, inspection, ....., periodic checks
7.2	6.2	

**WARNING — Other requirements and other EU Directives may be applicable to the product(s) falling within the scope of this standard.**

## Annex ZB (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, Machinery Safety Directive 98/37/EC, amended by 98/79/EC.

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 **A1** given in Table ZB.1 **A1** 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.

**Table ZB.1 — Correspondence between this European Standard and Directive 98/37/EC**

Clause(s) / subclause(s) of this EN	Essential Requirements (ER's) of the Directive 98/37/EC	Qualifying remarks / notes
5; 6	1.1.3	
5; 6	1.3.2	
7.1; 7.2	1.5.4	
6	4.1.2.3	
5; 6	4.1.2.4	Coefficient equals to five
	4.1.2.5	
7.1; 7.3	4.3.1	Nominal size of the rope
7.2	4.4.1	normal condition of use / instructions / limits of use
5.4; 6	6.1.2	Coefficients to be doubled (=10)

**WARNING — Other requirements and other EU Directives may be applicable to the product(s) falling within the scope of this standard.**

## Annex ZC (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 given in Table ZC.1 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.

**Table ZC.1 — Correspondence between this European Standard and Directive 2006/42/EC**

Clause(s) / subclause(s) of this EN	Essential Requirements (ER's) of the Directive 2006/42/EC	Qualifying remarks / notes
5; 6	1.1.3	
5; 6	1.3.2	
7.1; 7.2	1.5.4	
6	4.1.2.3	
5; 6	4.1.2.4	Coefficient equals to five
	4.1.2.5	
7.1; 7.3	4.3.1	Nominal size of the rope normal condition of use / instructions / limits of use
7.2	4.4.1	
5.4; 6	6.1.2	Coefficients to be doubled (=10)

**WARNING** - Other requirements and other EU Directives may be applicable to the product(s) falling within the scope of this standard. A1

## Bibliography

- [1] EN 1561, *Founding — Grey cast irons*
- [2] EN 1562, *Founding — Malleable cast irons*
- [3] DIN 1684-1<sup>1)</sup>, *Steel raw castings of malleable iron — General tolerances, machining allowances*
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- [5] EN 10025-2, *Hot rolled products of structural steels — Part 2: Technical delivery conditions for non-alloy structural steels*
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- [7] EN 45012, *General requirements for bodies operating assessment and certification/registration of quality systems (ISO/IEC Guide 62:1996)*
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<sup>1)</sup> Inactive for new design.

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