SLOVENSKI STANDARD
SIST EN 1677-5:2001+A1:2009

01-januar-2009

Sestavni deli obes - Varnost - 5. del: Kovani kavlji z varovalom - Kakovostni razred 4

Components for slings - Safety - Part 5: Forged steel lifting hooks with latch - Grade 4

Einzelteile für Anschlagmittel - Sicherheit - Teil 5: Geschmiedete Haken mit Sicherungsklappe - Güteklasse 4

Accessoires pour élingues - Sécurité - Partie 5: Crochets de levage en acier forgé à linguet - Classe 4

Ta slovenski standard je istoveten z: **EN 1677-5:2001+A1:2008**

ICS:

53.020.30	Pribor za dvigalno opremo	Accessories for lifting equipment

SIST EN 1677-5:2001+A1:2009 **en,fr,de**

EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

EN 1677-5:2001+A1

November 2008

ICS 53.020.30

Supersedes EN 1677-5:2001

English Version

Components for slings - Safety - Part 5: Forged steel lifting hooks with latch - Grade 4

Accessoires pour élingues - Sécurité - Partie 5: Crochets de levage en acier forgé à linguet - Classe 4

Einzelteile für Anschlagmittel - Sicherheit - Teil 5: Geschmiedete Haken mit Sicherungsklappe - Güteklasse 4

This European Standard was approved by CEN on 18 February 2001 and includes Amendment 1 approved by CEN on 9 September 2008.

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. Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the CEN Management Centre or to any CEN member.

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.

CEN members are the national standards bodies of 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.

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

Management Centre: rue de Stassart, 36 B-1050 Brussels

Ref. No. EN 1677-5:2001+A1:2008: E

Contents

Page

Foreword

This document (EN 1677-5:2001+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 May 2009, and conflicting national standards shall be withdrawn at the latest by December 2009.

This document supersedes EN 1677-5:2001.

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

The start and finish of text introduced or altered by amendment is indicated in the text by tags ⟨A1⟩ ⟨A1⟩.

This European Standard 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).

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

The other Parts of EN 1677 for components for slings are:

Part 1: Forged steel components - Grade 8
Part 2: Forged steel lifting hooks with latch - Grade 8
Part 3: Forged steel self-locking hooks - Grade 8
Part 4: Links - Grade 8
Part 6: Links - Grade 4

Annexes A and B of this European Standard are 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.

Introduction

This European Standard has been prepared to be a harmonized standard providing one means of complying with the essential safety requirements of the Machinery Directive and associated EFTA regulations.

The hooks covered by this Part of EN 1677 are normally supplied to be part of a sling, but they may also be used for other applications. In such instances it is important that the hook design is checked to ensure its fitness for the intended use.

The extent to which hazards are covered is indicated in the scope. In addition, lifting equipment shall conform as appropriate to EN 292 for hazards that are not covered by this standard.

1 Scope

This Part of EN 1677 specifies requirements for forged steel lifting hooks of grade 4 having latch and eye up to 31,5 t WLL, mainly for use in:

— chain slings according to EN 818-5

— steel wire rope slings according to prEN 13414-1:1998

— textile slings according to EN 1492-1, EN 1492-2.

intended for lifting objects, materials or goods.

This Part of EN 1677 does not apply to hand forged hooks.

The hazards covered by this Part of EN 1677 are identified in clause 4.

Annex A gives the bases for calculation of hook dimensions.

Annex B gives an example of a designation system for hooks of grade 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 292-1, Safety of machinery - Basic Concepts - General principles for design - Part 1 : Basic Terminology, methodology

EN 292-2:1991/A.1:1995, Safety of machinery - Basic concepts - General principles for design - Part 2 : Technical principles and specifications (Amendment A.1:1995)

EN 818-5, Short-link chain for lifting purposes – Safety - Part 5: Chain slings - Grade 4

EN 818-6, Short link chain for lifting purposes – Safety - Part 6: Chain slings - Specification for information for use and maintenance to be provided by the manufacturer

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

EN 1492-1, Textile slings – Safety - Part 1: Flat woven webbing slings made of man-made fibres

EN 1492-2, Textile slings – Safety - Part 2: Round slings made of man-made fibres

EN 10002-2:1991, Metallic materials - Tensile testing - Part 2: Verification of the force measuring system of the tensile testing machines

EN 10025:1990+A1:1993, Hot rolled products of non-alloy structural steels - Technical delivery - conditions

prEN 13414-1:1998, Steel wire ropes for slings – Safety - Part 1: Wire rope slings

EN 45012, General requirements for bodies operating assessment and certification/registration of quality systems (ISO/IEC Guide 62:1996)

EN ISO 9002:1994, Quality systems - Model for quality assurance in production, installation and servicing

ISO 643:1983, Steels - Micrographic determination of the ferritic or austenitic grain size

3 Terms and definitions

For the purposes of this Part of EN 1677, the following terms and definitions apply.

3.1
working load limit (WLL)
maximum mass that a hook is authorized to sustain in general lifting service, expressed as a code

NOTE This term has the same meaning as the term maximum working load used in annex A of EN 292-2:1991/A1:1995.

3.2
manufacturing proof force (MPF)
force applied to the hook during the manufacturing proof test

3.3
breaking force (BF)
maximum force reached during the static tensile test of the hook, at which the hook fails to retain the load

3.4
traceability code
series of letters and/or numbers marked on a hook that enables its manufacturing history, including the identity of the cast of steel used, to be traced

3.5
competent person
designated person, suitably trained, qualified by knowledge and practical experience, and with the necessary instruction to enable the required test and examination to be carried out

NOTE 4.18 of EN ISO 9002:1994 gives guidance on training.

3.6
lot
specified number of hooks from which samples are selected for testing purposes, and that have been manufactured from the same cast of steel and subjected to the same heat treatment process

4 Hazards

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

In order to provide the necessary strength and durability of hooks, this Part of EN 1677 gives requirements for the design, manufacture and testing to ensure that specified levels of performance are met.

Fatigue failure has not been identified as a hazard when grade 4 hooks having the specified levels of performance given in this standard are used for general lifting purposes.

Since failure can be caused by the incorrect choice of grade and specification of hook, this Part of EN 1677 also gives requirements for marking and the manufacturer's certificate.

Errors of fitting can also lead to failure and this Part of EN 1677 contains dimensional requirements to allow correct fit.

Risk of injury due to sharp edges, sharp angles or rough surfaces when handling is also covered by this standard.

Those aspects of safe use associated with good practice are given in EN 818-6.

Table 1 contains those hazards that require action to reduce risk identified by risk assessment as being specific and significant for forged steel hooks of grade 4.

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/A.1 : 1995	Relevant clause/subclause of this Part of EN 1677
1.e	Mechanical hazard due to inadequacy of strength	1.3.2 4.1.2.3 4.1.2.5 4.2.4 1.7.3	5 5 5 5 7
1.3	Cutting hazard	1.3.4	5.4
1.8	Friction or abrasion hazard	1.3.4	5.4
15	Errors of fitting hazard	1.5.4	5.2
17	Falling objects hazard	1.3.3	5.6

5 Safety requirements

5.1 Design

The form of the upper end shall be of the eye type as indicated in Figure 1.

The dimensions shall be such as to ensure articulation so that the force imposed is transmitted in the intended direction.

NOTE The form of the hook is not specified in detail. For example, a minimum value of dimension F (see Figure 1) as measured in any direction is specified so that the eye of the hook can accommodate a pin, but the eye of the hook need not be circular.

Each hook shall have a spring loaded latch conforming to 5.6. to ensure that the load cannot become accidentally unhooked.

5.2 Dimensions

The principal dimensions of the hooks shall conform to Table 2, in which the hook dimensions are related to the working load limit.

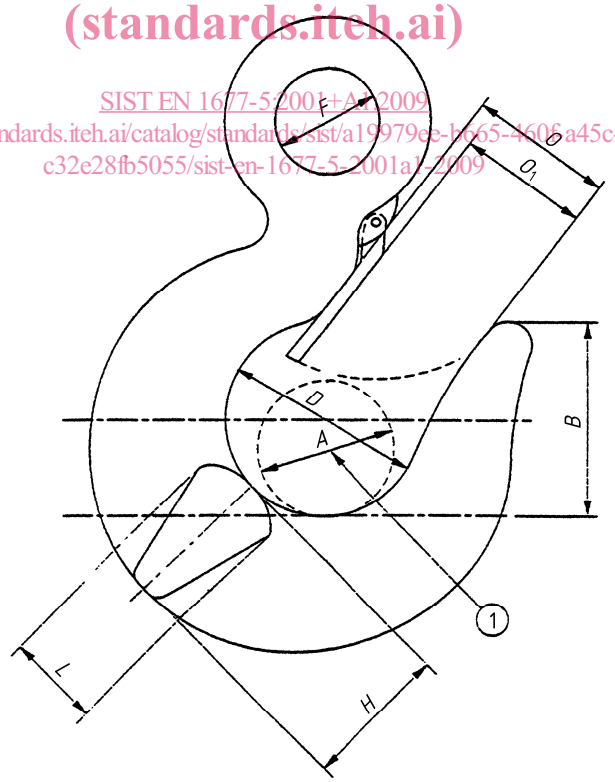
NOTE For direct use in wire rope slings and/or textile slings, dimension F should be larger than the minimum value given in Table 2

In addition, the following requirements shall be met:

a) the actual point height B shall be equal to or greater than the full throat opening, O, (see Figure 1);

b) the full throat opening O shall not exceed 95% of the actual seat diameter D;

c) the hook latch shall be capable of closing over the maximum diameter of bar A, as indicated in Figure 1, that can be admitted through the actual throat opening O_1.



Key
1 Maximum diameter of bar

Figure 1 — Dimensions of hook

Table 2 — Dimensions of hooks (see Figure 1)

Code number	Working load limit (WLL) t	D min. mm	O min. mm	O_1 min. mm	F min. mm	H max. mm	L max. mm
6	0,56	22	17	16	12	25	17
7	0,75	26	20	18	14	29	20
8	1	30	23	21	16	35	23
9	1,25	34	26	24	18	38	26
10	1,6	38	29	27	20	43	29
11	2	42	32	30	23	48	32
13	2,65	49	37	35	26	55	37
14	3	52	40	37	28	59	40
16	4	60	46	43	32	68	46
18	5	67	51	48	36	76	51
19	5,6	71	54	51	38	80	54
20	6,3	75	57	53	40	85	57
22	7,5	82	63	58	44	93	63
23	8	85	65	60	46	96	65
25	10	95	72	68	51	107	72
26	10,6	98	75	70	52	111	75
28	12,5	106	81	76	57	120	81
32	16	119	91	85	64	135	91
36	20	134	102	96	72	152	102
40	25	150	115	107	80	170	115
45	31,5	168	129	120	90	190	129

5.3 Materials and heat treatment

5.3.1 Quality of material

5.3.1.1 General

Within the limitations given in 5.3.1.2 to 5.3.1.4, the manufacturer shall select the type of steel to be used so that the hooks, when suitably heat-treated conform to the mechanical properties specified in this part of EN 1677.

5.3.1.2 Type of steel

The steel shall be produced by an electric process or by an oxygen blown process.

5.3.1.3 Deoxidation

The steel shall be fully killed as defined in EN 10025:1990+A1:1993, stabilized against strain age embrittlement, and have an austenitic grain size of 5 or finer when tested in accordance with ISO 643: 1983.

5.3.1.4 Chemical composition

To ensure that hooks are stabilized against strain age embrittlement during service, the steel shall contain at least 0,025 % aluminium.

The steel shall contain no more sulfur and phosphorus than the limits given in Table 3.

Table 3 — Sulfur and phosphorous content

Element	Maximum mass content as determined by	
	Cast analysis %	Check analysis %
Sulfur	0,025	0,030
Phosphorus	0,025	0,030

The silicon content of the steel shall be as specified in Table 4.

NOTE The purpose of this requirement is to limit the detrimental effect on the hook as part of a chain sling when used for lifting in galvanizing baths.

Table 4 — Silicon content

Element	Mass content as determined by	
	Cast analysis %	Check analysis %
Silicon	0,12 to 0,30	0,15 to 0,35

5.3.2 Heat Treatment

Each hook shall either be hardened from a temperature above the AC_3 point and tempered, or normalized from a temperature above the AC_3 point, before being subjected to the manufacturing proof force. The tempering temperature shall be at least 475 °C.

The normalizing or tempering conditions shall be at least as effective as a temperature of 475 °C maintained for a period of 1 h.

NOTE A method of verification is as follows. After the hooks have been reheated to and maintained for 1 h at 475 °C and then cooled to room temperature they should conform in the finished condition to 5.5.2 and 5.5.3.

5.4 Manufacturing methods and workmanship

5.4.1 Manufacture

Each hook body shall be forged hot in one piece. Excess metal from the forging operation shall be removed cleanly leaving the surface free from sharp edges. After heat-treatment, furnace scale shall be removed and the hook body shall be free from harmful surface defects, including cracks.