

STN	Žeriavy. Všeobecný návrh. Časť 3-5: Medzné stavy a overovanie spôsobilosti kovaných hákov.	STN EN 13001-3-5 27 0043
------------	---	--

Cranes - General design - Part 3-5: Limit states and proof of competence of forged hooks

Táto norma obsahuje anglickú verziu európskej normy.
This standard includes the English version of the European Standard.

Táto norma bola oznámená vo Vestníku ÚNMS SR č. 01/17

Obsahuje: EN 13001-3-5:2016

Oznámením tejto normy sa ruší
STN P CEN/TS 13001-3-5 (27 0043) z októbra 2010

123833

Úrad pre normalizáciu, metrológiu a skúšobníctvo SR, 2017
Podľa zákona č. 264/1999 Z. z. v znení neskorších predpisov sa môžu slovenské technické normy
rozmnžovať a rozširovať iba so súhlasom Úradu pre normalizáciu, metrológiu a skúšobníctvo SR.

EUROPEAN STANDARD
NORME EUROPÉENNE
EUROPÄISCHE NORM

EN 13001-3-5

August 2016

ICS 53.020.20; 53.020.30

Supersedes CEN/TS 13001-3-5:2010

English Version

**Cranes - General design - Part 3-5: Limit states and proof
of competence of forged hooks**

Appareils de levage à charge suspendue - Conception
générale - Partie 3-5 : Etats limites et vérification des
crochets forgés

Krane - Konstruktion allgemein - Teil 3-5:
Grenzzustände und Sicherheitsnachweise von
geschmiedeten Haken

This European Standard was approved by CEN on 19 May 2016.

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-CENELEC 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-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, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and United Kingdom.



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

CEN-CENELEC Management Centre: Avenue Marnix 17, B-1000 Brussels

Contents

Page

European foreword.....	4
Introduction	5
1 Scope	6
2 Normative references	6
3 Terms and definitions, symbols and abbreviations	8
3.1 Terms and definitions	8
3.2 Symbols and abbreviations	9
4 General requirements	11
4.1 Materials.....	11
4.2 Workmanship.....	13
4.3 Manufacturing tolerances of forgings.....	14
4.4 Heat treatment.....	14
4.5 Cold forming by proof loading.....	14
4.6 Hook body geometry.....	14
4.7 Hook shank machining.....	16
4.8 Nut	17
4.9 Effect of hook suspension.....	17
5 Static strength	17
5.1 General.....	17
5.2 Vertical design load.....	17
5.3 Horizontal design force.....	18
5.4 Bending moment of the shank.....	19
5.5 Hook body, design stresses.....	23
5.6 Hook shank, design stresses	25
5.7 Hook, proof of static strength	25
6 Fatigue strength.....	27
6.1 General.....	27
6.2 Vertical fatigue design force.....	27
6.3 Horizontal fatigue design force.....	27
6.4 Fatigue design bending moment of shank	28
6.5 Proof of fatigue strength, hook body.....	29
6.6 Proof of fatigue strength, hook shank.....	34
6.7 Fatigue design of hook shanks for stand alone hooks	40
7 Verification of the safety requirements and/or protective measures.....	41
7.1 General.....	41
7.2 Scope of testing and sampling	41
7.3 Testing of mechanical properties.....	41
7.4 Test loading.....	41
8 Information for use	42
8.1 Maintenance and inspection	42
8.2 Marking.....	43
8.3 Safe use	44
Annex A (informative) Sets of single hooks	45
A.1 A series of single hooks of type RS/RSN, dimensions of forgings	45

A.2	A series of single hooks of type RF/RFN, dimensions of forgings	47
A.3	A series of single hooks of type B, dimensions of forgings	49
Annex B (informative)	A series of ramshorn hooks of type RS/RSN and RF/RFN, dimensions of forgings.....	51
Annex C (informative)	Dimensional tolerances of forgings	53
Annex D (normative)	Static limit design forces of hook bodies	54
D.1	Static limit design forces of hook bodies for hooks of type RS and RF	54
D.2	Static limit design forces of hook bodies for a series of hooks of type B, with additional materials	55
Annex E (normative)	Fatigue limit design forces of hook bodies.....	56
E.1	Fatigue limit design forces of hook bodies for hooks of type RS and RF	56
E.2	Fatigue limit design forces of hook bodies for a series of hooks of type B, with additional materials	57
Annex F (informative)	Sets of hook shank and thread designs.....	58
F.1	A series of hook shank and thread designs, a knuckle thread	58
F.2	A series of hook shank and thread designs, a metric thread	60
F.3	A series of hook shank and thread designs, a modified metric thread	62
F.4	Hook shank and thread designs for hooks of type B.....	64
Annex G (normative)	Bending of curved beams	66
G.1	Basic formulae for stresses	66
G.2	Approximation of the reference moment of inertia.....	67
Annex H (normative)	Calculation of hook suspension tilting resistance, articulation by a hinge or a rope reeving system	69
H.1	General	69
H.2	Articulation of hook by a hinge.....	70
H.3	Articulation of a hook suspension by a balanced rope reeving	70
Annex I (informative)	Guidance for the selection of a hook body size using Annexes D and E.....	73
I.1	General	73
I.2	Case description	73
I.3	Proof of static strength	73
I.4	Proof of fatigue strength	74
I.5	Final selection of hook.....	74
Annex J (normative)	Information to be provided by the hook manufacturer	75
Annex K (informative)	Guidance on cold forming by proof loading	76
Annex L (informative)	Selection of a suitable set of crane standards for a given application.....	77
Annex ZA (informative)	Relationship between this European Standard and the Essential Requirements of EU Directive 2006/42/EC	79
Bibliography	80

European foreword

This document (EN 13001-3-5:2016) has been prepared by Technical Committee CEN/TC 147 “Crane — Safety”, the secretariat of which is held by BSI.

This document supersedes CEN/TS 13001-3-5:2010.

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 February 2017, and conflicting national standards shall be withdrawn at the latest by February 2017.

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 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 Annex ZA, which is an integral part of this document.

The major changes in this standard compared to CEN/TS 13001-3-5 are in 4.1, 4.2, 6.5, Clause 7 and Annex K (renumbered Annex J). A new Annex C has been added. Annexes E and F have been removed. New hook sizes were added to Annexes A and B.

This European Standard is one part of the EN 13001 series. The other parts are as follows:

- *Part 1: General principles and requirements*
- *Part 2: Load actions*
- *Part 3-1: Limit states and proof of competence of steel structures*
- *Part 3-2: Limit states and proof of competence of wire ropes in reeving systems*
- *Part 3-3: Limit states and proof of competence of wheel/rail contacts*
- *Part 3-4: Limit states and proof of competence of machinery - Bearings¹*
- *Part 3-6: Limit states and proof of competence of machinery - Hydraulic cylinders²*

For the relationship with other European Standards for cranes, see Annex L.

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, 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, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom.

¹ Currently at Enquiry stage.

² Currently at Enquiry stage.

Introduction

This European Standard has been prepared to provide a means for the mechanical design and theoretical verification of cranes to conform to essential health and safety requirements. This European Standard also establishes interfaces between the user (purchaser) and the designer, as well as between the designer and the component manufacturer, in order to form a basis for selecting cranes and components.

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

The machinery concerned and the extent to which hazards, hazardous situations and events are covered are indicated in the scope of this 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 machines.

1 Scope

This European Standard is to be used together with EN 13001-1 and EN 13001-2 and, as such, they specify general conditions, requirements and methods to prevent by design and theoretical verification, mechanical hazards in crane hooks.

This European Standard covers the following parts of hooks and types of hooks:

- bodies of any type of hooks made of steel forgings;
- machined shanks of hooks with a thread/nut suspension.

Principles of this European Standard can be applied to machined shanks of hooks in general. However, stress concentration factors relevant to designs not given in this standard would have to be determined and applied.

NOTE 1 Cast hooks and plate hooks, which are those, assembled of one or several parallel parts of rolled steel plates, are not covered in this European Standard.

The following is a list of significant hazardous situations and hazardous events that could result in risks to persons during normal use and foreseeable misuse. Clauses 4 to 8 of this document are necessary to reduce or eliminate the risks associated with the following hazards:

- a) exceeding the limits of strength (yield, ultimate, fatigue);
- b) exceeding temperature limits of material.

The requirements of this European Standard are stated in the main body of the document and are applicable to forged hook designs in general.

The commonly used hook body and shank designs listed in Annexes A, B and F are only examples and should not be referred to as requirements of this European Standard. Annex I gives guidance for the selection of a hook size, where a hook body is in accordance with Annex A or B. The selection of hook form is not limited to those shown in Annexes A and B.

This European Standard is applicable to cranes, which are manufactured after the date of approval of this European Standard by CEN, and serves as a reference base for product standards of particular crane types.

NOTE 2 This part of EN 13001 deals only with the limit state method in accordance with EN 13001-1.

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

EN 10025-3, *Hot rolled products of structural steels - Part 3: Technical delivery conditions for normalized/normalized rolled weldable fine grain structural steels*

EN 10083-3, *Steels for quenching and tempering - Part 3: Technical delivery conditions for alloy steels*

EN 10204, *Metallic products - Types of inspection documents*

EN 10222-4, *Steel forgings for pressure purposes - Part 4: Weldable fine grain steels with high proof strength*

- EN 10228-1, *Non-destructive testing of steel forgings - Part 1: Magnetic particle inspection*
- EN 10228-2, *Non-destructive testing of steel forgings - Part 2: Penetrant testing*
- EN 10228-3, *Non-destructive testing of steel forgings - Part 3: Ultrasonic testing of ferritic or martensitic steel forgings*
- EN 10250-1, *Open die steel forgings for general engineering purposes - Part 1: General requirements*
- EN 10250-2, *Open die steel forgings for general engineering purposes - Part 2: Non-alloy quality and special steels*
- EN 10250-3, *Open die steel forgings for general engineering purposes - Part 3: Alloy special steels*
- EN 10254, *Steel closed die forgings - General technical delivery conditions*
- EN 13001-1, *Cranes - General design - Part 1: General principles and requirements*
- EN 13001-2, *Crane safety - General design - Part 2: Load actions*
- EN 13001-3-2, *Cranes - General design - Part 3-2: Limit states and proof of competence of wire ropes in reeving systems*
- EN ISO 148-1, *Metallic materials - Charpy pendulum impact test - Part 1: Test method (ISO 148-1)*
- EN ISO 642, *Steel - Hardenability test by end quenching (Jominy test) (ISO 642)*
- EN ISO 643, *Steels - Micrographic determination of the apparent grain size (ISO 643)*
- EN ISO 898-2, *Mechanical properties of fasteners made of carbon steel and alloy steel - Part 2: Nuts with specified property classes - Coarse thread and fine pitch thread (ISO 898-2)*
- EN ISO 4287, *Geometrical product specifications (GPS) - Surface texture: Profile method - Terms, definitions and surface texture parameters (ISO 4287)*
- EN ISO 6892-1, *Metallic materials - Tensile testing - Part 1: Method of test at room temperature (ISO 6892-1)*
- EN ISO 12100:2010, *Safety of machinery - General principles for design - Risk assessment and risk reduction (ISO 12100:2010)*
- ISO 965-1, *ISO general purpose metric screw threads — Tolerances — Part 1: Principles and basic data*
- ISO 4306-1:2007, *Cranes — Vocabulary — Part 1: General*

koniec náhľadu – text ďalej pokračuje v platenej verzii STN