SLOVENSKI STANDARD
SIST EN 13001-3-5:2016/oprA1:2018

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Žerjavi - Konstrukcija, splošno - 3-5. del: Mejna stanja in dokaz varnosti kovanih kavljev

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

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

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

Ta slovenski standard je istoveten z: **EN 13001-3-5:2016/prA1**

ICS:

53.020.20	Dvigala	Cranes

SIST EN 13001-3-5:2016/oprA1:2018 **en,fr,de**

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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

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This draft amendment is submitted to CEN members for enquiry. It has been drawn up by the Technical Committee CEN/TC 147.

This draft amendment A1, if approved, will modify the European Standard EN 13001-3-5:2016. If this draft becomes an amendment, CEN members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for inclusion of this amendment into the relevant national standard without any alteration.

This draft amendment 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.

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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.

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

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Contents

Page

European foreword

This document (EN 13001-3-5:2016/prA1:2017) has been prepared by Technical Committee CEN/TC 147 “Crane — Safety”, the secretariat of which is held by BSI.

This document is currently submitted to the CEN Enquiry.

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 of EN 13001-3-5:2016.

1 Modification to the Title

Change the Title to read:

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

2 Modification to the European foreword

Replace the 7th paragraph (that begins with "The major changes"*) with:*

"The major changes in this standard compared to EN 13001-3-5:2016 are in 4.1, 4.2, 6.5.4, 6.6.4 and 8.2 to extend the scope of the standard to "cast hooks".

3 Modifications to Clause 1, "Scope"

Replace the 1st list item with:

— "bodies of any type of hooks made of steel forgings or steel castings;".

Replace Note 1 with:

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

Replace the sentence after the 4th paragraph list with:

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

4 Modifications to Clause 2, "Normative references"

Add the following references:

EN 1369:2012, *Founding — Magnetic particle testing*

EN 1370:2011, *Founding — Examination of surface condition*

EN 1371-1:2011, *Founding — Liquid penetrant testing — Part 1: Sand, gravity die and low pressure die castings*

EN 10340:2007, *Steel casting for structural uses*

EN ISO 6506-1:2014, *Metallic materials — Brinell hardness test — Part 1: Test method*

5 Modifications to Clause 3, "Terms and definitions, symbols and abbreviations"

In 3.1.1, replace the definition with:

"upper part of the hook, from which the hook is suspended to the hoist medium of the crane"

In 3.2, Table 1, 1st row, replace with:

A_{d1}	Cross section area of the unmachined shank

In 3.2, Table 1, 14th row, replace with:

d_1	Diameter of the unmachined shank

In 3.2, Table 1, 36th row, replace with:

I_{d1}	Moment of inertia of the unmachined shank

6 Modifications to Clause 4, "General requirements"

In 4.1.1, replace the whole sub-clause with:

"The hook material shall fulfill the requirements of this clause independent of the material standard applied (see 4.1.2) and independent whether classification of the material is applied or not (see 4.1.3).

The hook material in the finished product shall have sufficient ductility to permanently deform before losing the ability to carry the load, at the temperatures specified for the use of the hook. Particularly the hook material shall fulfill the following conditions:

— the ratio of ultimate strength (f_u) to yield stress (f_y) $f_u/f_y \geq 1{,}2$. For the materials, which do not fulfill this condition, the design value of f_y shall be limited to f_u /1,2;

— the percentage elongation at fracture $A \geq 10$ % on a gauge length $L_0 = 5{,}65 \times \sqrt{S_0}$ (where S_0 is the original cross-sectional area).

The hook material, after heat treatment, shall have minimum Charpy-V impact toughness in accordance with Table 2.

Table 2 — Impact test requirement for hook material

Operation temperature	Impact test temperature	Minimum impact toughness A_V
$T \geq 0$ °C	+20 °C	27 J
$T \geq -20$ °C	−0 °C	27 J
$T \geq -30$ °C	−20 °C	27 J
$T \geq -40$ °C	−30 °C	35 J
$T \geq -50$ °C	−40 °C	35 J

To satisfy the requirements of the operating temperature, the manufacturer shall select the steel, which after suitable heat treatment, shall be consistent with achieving the chosen mechanical property grade for the selected hook form, taking into account its individual ruling thickness.

The steel shall be fully killed, stabilized against strain age embrittlement, ensured by having sufficient content of aluminium (minimum of 0,02 %). The steel shall contain no more sulphur and phosphorus than the limits given in Table 3.

Table 3 — Sulphur and phosphorus content

Element	Maximum mass content as determined by	
	Cast analysis	Check analysis
Sulphur (S)	0,020 [%]	0,025 [%]
Phosphorus (P)	0,020 [%]	0,025 [%]
Sum of S + P	0,035 [%]	0,045 [%]

The steel for forged hooks shall have a grain size of 8 or finer, with grain size determined in accordance with EN ISO 643.

Where quenched and tempered steel is used, the hardenability of the steel shall fulfil the requirement of the Jominy-ratio given in Table 4. The Jominy-ratio J30/J1,5 is the ratio between J30 and J1,5, where J30 and J1,5 mean the hardness at depths 30 mm and 1,5 mm correspondingly, determined by Jominy face-quenching test in accordance with EN ISO 642. The tests shall be carried out per melt and the values be given in the technical hook information, see Annex J. For more information on hardening properties and hardness profiles, see EN 10083-3.

Where the mechanical properties of cast hooks are tested for each single hook, the hardenability may be verified by HB-testing in accordance with EN 6506-1 in the section of the test specimen at 1,5 mm and 30 mm depth from the surface. The hardness ratio shall fulfil the minimum requirement (Jominy-ratio) given in Table 4.

Table 4 — Hardenability of quenched and tempered materials, Jominy-ratio

Ultimate strength f_u N/mm²	**Minimum required Jominy-ratio J30/J1,5**
$540 \le f_u < 800$	65 %
$800 \le f_u$	93 %

”.

In 4.1.2, 2nd sentence, delete the word “forged”.

In 4.1.2, Table 5, replace the table with:

"

Table 5 — Suitable materials for hooks

	Material standard	Selected qualities	
Forged hooks	EN 10025-3	S355N	S420N
	EN 10222-4	P355NH P355QH	P420NH P420QH
	EN 10250-2	S355J2	
	EN 10083-3	25CrMo4+QT	34CrNiMo6+QT
	EN 10250-3	34CrMo4+QT 36CrNiMo4+QT	30CrNiMo8+QT
Cast hooks	EN 10213-3	G20Mn5 + N	G20Mn5 + QT
	EN 10340	G18NiMoCr3-6 + QT	GX4CrNi13-4 + QT

".

In 4.1.3, 1st sentence, delete the word "forged".

In 4.2, after title, add a new subtitle "4.2.1 Forged hooks".

In 4.2, after subclause 4.2.1, insert a new subclause 4.2.2:

"**4.2.2 Cast hooks**

The manufacturing process, in factory tests and delivery conditions shall meet the requirements of EN 1559.

The castings shall be heat-treated to meet the mechanical properties of the applicable grade.

Prior to quenching, the ingate system is to be roughly removed. After quenching excess material from the casting system shall be removed cleanly leaving the surface free from sharp edges.

The surface roughness of the hook seat in the finished product shall be equal to or better than Rz 500 µm, for example S2 in accordance with EN 1370. Grinding may be used to reach the required surface quality. Any grinding marks shall be in a circumferential direction in respect to the seat circle.

After heat treatment the surface of a cast hook shall be inspected for defects using appropriate NDT-methods. Requirements of quality class 2 of EN 1369 or class 2 of EN 1371-1 shall be met.

The inner quality has to be inspected by ultrasonic inspection in accordance with EN 12680-1 and quality class 2 shall be met.

Weld procedures for production welding are required for all repairs during manufacturing, and shall be qualified in accordance with ISO/TR 15608:2013-04 and EN ISO 15614-1. Subsequently the welded part must be post weld heat treated.".

In 4.3, 1st paragraph, 1st sentence, replace the word "forged" *with* "unmachined".

In 4.4, delete the word "forged".

In 4.5, 1st paragraph, 1st sentence, replace the sentence with:

"As the last stage of the manufacturing process, a forged hook may be subjected to a "proof load test" and cold forming as a result. See guidance in Annex K.".