SLOVENSKI STANDARD
SIST EN 1993-1-4:2007/A1:2015

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Evrokod 3: Projektiranje jeklenih konstrukcij - 1-4. del: Splošna pravila - Dodatna pravila za nerjavna jekla

Eurocode 3 - Design of steel structures - Part 1-4: General rules - Supplementary rules for stainless steels

Eurocode 3: Bemessung und Konstruktion von Stahlbauten - Teil 1-4: Allgemeine Bemessungsregeln - Ergänzende Regeln zur Anwendung von nichtrostenden Stählen

Eurocode 3 - Calcul des structures en acier - Partie 1-4: Règles générales - Règles supplémentaires pour les aciers inoxydables

Ta slovenski standard je istoveten z: **EN 1993-1-4:2006/A1:2015**

ICS:

77.140.20	Visokokakovostna jekla	Stainless steels
91.010.30	Tehnični vidiki	Technical aspects
91.080.10	Kovinske konstrukcije	Metal structures

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EUROPEAN STANDARD

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English Version

Eurocode 3 - Design of steel structures - Part 1-4: General rules - Supplementary rules for stainless steels

Eurocode 3 - Calcul des structures en acier - Partie 1- 4 : Règles générales - Règles supplémentaires pour les aciers inoxydables

Eurocode 3: Bemessung und Konstruktion von Stahlbauten - Teil 1-4: Allgemeine Bemessungsregeln - Ergänzende Regeln zur Anwendung von nichtrostenden Stählen

This amendment A1 modifies the European Standard EN 1993-1-4:2006; it was approved by CEN on 1 March 2015.

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

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Foreword

This document (EN 1993-1-4:2006/A1:2015) has been prepared by Technical Committee CEN/TC 250 “Structural Eurocodes”, 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of an identical text or by endorsement, at the latest by June 2016, and conflicting national standards shall be withdrawn at the latest by June 2016.

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1 Modification to the Foreword

In the Foreword, in the section "National Annex for EN 1993-1-4"*, in the 2nd paragraph, add the following clauses for national choices at the end of the list:*

"

— 7(1),
— A.2(8) and
— A.3, Table A.4.".

2 Modifications to 1.2, Normative references

Replace "EN 1993-1-1" *with* "EN 1993-1-1:2005".

Replace the following references:

"EN 10088-1 *Stainless steels – Part 1: List of stainless steels;*

EN 10088-2, *Stainless steels — Part 2: Technical delivery conditions for sheet/plate and strip for general purposes;*

EN 10088-3, *Stainless steels — Part 3: Technical delivery conditions for semi-finished products, bars, rods and sections for general purposes;*"

with the following one:

"EN 10088 (all parts), *Stainless steels*".

3 Modifications to 2.1.1, General

Replace Paragraph (1):

"(1) The provisions given in this Part 1-4 should be applied only to design using austenitic, austenitic-ferritic and ferritic stainless steels."

with:

"(1) The design provisions specified in this Part 1-4 are applicable for stainless steel material in the annealed condition in accordance with Table 2.1 and for austenitic stainless steel material in the cold worked condition in accordance with Table 2.2.

The typical grades used for the construction of building structures are listed in Tables 2.1 and 2.2. The design rules in this standard may also be applied to other grades in EN 10088–4 and EN 10088–5, provided the relevant partial factor (γ_M) is increased by 10 %. Specialist advice should be sought regarding the durability, fabrication, weldability, fatigue resistance and high temperature performance of these grades, if appropriate.".

In Paragraph (3), replace "EN 10088" *with* "EN standards".

Delete Paragraphs (4) and (5).

4 Modifications to 2.1.2, Material properties for stainless steel

Replace Paragraphs (1) to (5), including Table 2.1, with the following text:

"(1) In design calculations the values should be taken as follows, independent of the direction of rolling:

— yield strength f_y: the nominal stress (0,2 % proof stress) specified in Tables 2.1 and 2.2;

— ultimate tensile strength f_u: the nominal ultimate tensile strength specified in Tables 2.1 and 2.2.

(2) The ductility requirements in EN 1993-1-1:2005, 3.2.2 also apply to stainless steels. Steels conforming with one of the steel grades listed in Table 2.1 should be accepted as satisfying these requirements. The steels listed in Table 2.2 should have declared properties that meet the ductility requirements given in EN 1993-1-1.

(3) Higher strength values, for example derived from cold working the base material, may be used in design provided they are verified by tests in accordance with Clause 7.

Table 2.1 — Nominal values of the yield strength f_y and the ultimate tensile strength f_u for structural stainless steels to EN 10088 [a]

Type of stainless steel	Grade	Product form							
		Cold rolled strip		Hot rolled strip		Hot rolled plate		Bars, rods and sections	
		Nominal thickness t							
		$t \leq 8$ mm		$t \leq 13,5$ mm		$t \leq 75$ mm		$t \leq 250$ mm	
		f_y	f_u	f_y	f_u	f_y	f_u	f_y	f_u
		N/mm^2	N/mm^2	N/mm^2	N/mm^2	N/mm^2	N/mm^2	N/mm^2	N/mm^2
Ferritic steels	1.4003	280	450	280	450	250 [c]	450 [c]	260 [d]	450 [d]
	1.4016	260	450	240	450	240 [c]	430 [c]	240 [d]	400 [d]
	1.4512	210	380	210	380	-	-	-	-
Austenitic steels	1.4306	220	520	200	520	200	500	180	460
	1.4307							175	500
	1.4541							190	500
	1.4301	230	540	210	520	210	520		
	1.4401	240	530	220	530	220	520	200	500
	1.4404								
	1.4539							230	530
	1.4571		540		540			200	500
	1.4432	240	550	220	550	220	520		
	1.4435								
	1.4311	290	550	270	550	270	550	270	550
	1.4406	300	580	280	580	280	580	280	580
	1.4439	290		270		270			
	1.4529	-	-	-	-	300	650	300 [b]	650 [b]

	1.4547	320	650	300	650	300	650	300	650
	1.4318	350	650	330	650	330	630	-	-
Austenitic-ferritic steels	1.4062	530 [e]	700 [e]	480 [f]	680 [f]	450 [g]	650 [g]	380 [b]	650 [b]
	1.4162	530 [e]	700 [e]	480 [f]	680 [f]	450	650	450 [b]	650 [b]
	1.4482	500 [e]	700 [e]	480 [f]	660 [f]	450	650	400 [b]	650 [b]
	1.4662	550 [e]	750 [e]	550	750	480	680	450 [b]	650 [b]
	1.4362	450	650	400	650	400	630	400 [b]	600 [b]
	1.4462	500	700	460	700	460	640	450 [b]	650 [b]

[a] The nominal values of f_y and f_u given in this table may be used in design without taking special account of anisotropy or strain hardening effects.

[b] $t \leq 160$ mm

[c] $t \leq 25$ mm

[d] $t \leq 100$ mm

[e] $t \leq 6{,}4$ mm

[f] $t \leq 10$ mm

[g] $t \leq 50$ mm ($f_y = 430$ N/mm^2 and $f_u = 625$ N/mm^2 for 50 mm $< t \leq 75$ mm)

Table 2.2 —Nominal values of the yield strength f_y and the ultimate tensile strength f_u for structural stainless steels to EN 10088 in the cold worked condition

Grade	Cold Worked Condition			
	CP350		CP500	
	f_y N/mm^2	f_u [a] N/mm^2	f_y N/mm^2	f_u [a] N/mm^2
1.4301	350	600	460	650
1.4318	[b]	[b]	460	650
1.4541	350	600	460	650
1.4401	350	600	460	650
1.4571	350	600	460	650

[a] According to EN 10088, the CP classification defines only the required 0,2 % proof strength, f_y. The steels used should have declared properties that meet the conservative tabulated values for tensile strength, f_u, unless type testing is used to demonstrate the acceptability of lower values.

[b] Grade 1.4318 develops a 0,2 % proof strength of 350 N/mm^2 in the annealed condition; see Table 2.1.

".

5 Modification to 2.1.4, Fracture toughness

In Paragraph (1), in the 2nd NOTE, replace "Annex A.5.3" *with* "A.5".

6 Modification to 2.3, Welding consumables

Renumber Paragraph (2) as (3) and add a new Paragraph (2):

"(2) As an exception to 2.3(1), for austenitic stainless steel in the cold worked condition, the filler metal may have lower nominal strength than for the base material, see 6.3. In general, austenitic filler metals should be used for welding

stainless steels in the cold worked condition. Austenitic-ferritic filler metals may also be used, provided the mechanical properties of the joint are verified by tests in accordance with Clause 7.".

Then delete the old Paragraph (3) but keep the NOTE and place it under the new Paragraph (3).

7 Modification to Clause 3, Durability

Delete Paragraphs (1) to (5) and add a new Paragraph (1):

"(1) Annex A gives a procedure for selecting an appropriate grade of stainless steel for the service environment in which the structural members are to be used.".

8 Modification to 5.1, General

Replace Paragraph (5) with:

"(5) Where members may be subjected to significant deformation, account may be taken of the potential for enhanced strength gained through the cold worked properties of austenitic stainless steel. Where this cold working increases the actions resisted by the members, the joints should be designed to be consistent with the increased member resistance, especially where capacity design is required.".

9 Modifications to 5.2.2, Classification of compression elements

In Table 5.2 (sheet 1 of 3), replace Rows 2, 4, 5 and 7 with the following ones:

"

Class	Part subject to bending	Part subject to compression	Part subject to bending and axial force
…			
1	$c/t \le 72\varepsilon$	$c/t \le 33\varepsilon$	$when\ \alpha > 0{,}5: \ c/t \le \frac{396\varepsilon}{13\alpha - 1}$ $when\ \alpha \le 0{,}5: \ c/t \le \frac{36\varepsilon}{\alpha}$
2	$c/t \le 76\varepsilon$	$c/t \le 35\varepsilon$	$when\ \alpha > 0{,}5: \ c/t \le \frac{420\varepsilon}{13\alpha - 1}$ $when\ \alpha \le 0{,}5: \ c/t \le \frac{38\varepsilon}{\alpha}$
…			
3	$c/t \le 90\varepsilon$	$c/t \le 37\varepsilon$	$c/t \le 18{,}5\varepsilon\sqrt{k_\sigma}$ For k_σ see EN 1993-1-5
…			

".