



SLOVENSKI STANDARD
SIST EN 1993-1-4:2007/kFprA1:2014
01-november-2014

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/FprA1

ICS:

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

SIST EN 1993-1-4:2007/kFprA1:2014 **en,fr,de**

EUROPEAN STANDARD
NORME EUROPÉENNE
EUROPÄISCHE NORM

FINAL DRAFT
EN 1993-1-4:2006

FprA1

August 2014

ICS 91.010.30; 91.080.10

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 draft amendment is submitted to CEN members for unique acceptance procedure. It has been drawn up by the Technical Committee CEN/TC 250.

This draft amendment A1, if approved, will modify the European Standard EN 1993-1-4:2006. 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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Foreword

This document (EN 1993-1-4:2006/FprA1:2014) has been prepared by Technical Committee CEN/TC 250 "Structural Eurocodes", the secretariat of which is held by BSI.

This document is currently submitted to the Unique Acceptance Procedure.

iTeh STANDARD PREVIEW
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[SIST EN 1993-1-4:2007/A1:2015](https://standards.iteh.ai/catalog/standards/sist/d79e8840-2ef9-4b47-8d19-729e1d0e587b/sist-en-1993-1-4-2007-a1-2015)

<https://standards.iteh.ai/catalog/standards/sist/d79e8840-2ef9-4b47-8d19-729e1d0e587b/sist-en-1993-1-4-2007-a1-2015>

EN 1993-1-4:2006/FprA1:2014 (E)**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 | 200 | 500 |
| | 1.4401 | 240 | 530 | 220 | 530 | 220 | 520 | 200 | 500 |
| | 1.4404 | | | | | | | 230 | 530 |
| | 1.4539 | | | | | | | 200 | 500 |
| | 1.4571 | 240 | 540 | 220 | 540 | 220 | 520 | 200 | 500 |
| | 1.4432 | | 200 | | 500 | | | | |
| | 1.4435 | 240 | 550 | 220 | 550 | 220 | 520 | 200 | 500 |
| | 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 | | 280 | 580 |
| 1.4529 | - | - | - | - | 300 | 650 | 300 ^b | 650 ^b | |

EN 1993-1-4:2006/FprA1:2014 (E)

| | | | | | | | | | |
|--|--------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|------------------|
| | 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 |
| <p>^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.</p> <p>^b $t \leq 160$ mm</p> <p>^c $t \leq 25$ mm</p> <p>^d $t \leq 100$ mm</p> <p>^e $t \leq 6,4$ mm</p> <p>^f $t \leq 10$ mm</p> <p>^g $t \leq 50$ mm ($f_y = 430$ N/mm² and $f_u = 625$ N/mm² for 50 mm $< t \leq 75$ mm)</p> | | | | | | | | | |

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 |
| <p>^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.</p> <p>^b Grade 1.4318 develops a 0,2 % proof strength of 350 N/mm² in the annealed condition; see Table 2.1.</p> | | | | |

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:

“

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

”

EN 1993-1-4:2006/FprA1:2014 (E)

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

“

| ... | | | | |
|--|------------------------|-----------------------------|--|--|
| Class | Section type | Part subject to compression | Part subject to bending and axial force | |
| | | | Tip in compression | Tip in tension |
| ... | | | | |
| 1 | Cold formed and welded | $c/t \leq 9\varepsilon$ | $c/t \leq \frac{9\varepsilon}{\alpha}$ | $c/t \leq \frac{9\varepsilon}{\alpha\sqrt{\alpha}}$ |
| 2 | Cold formed and welded | $c/t \leq 10\varepsilon$ | $c/t \leq \frac{10\varepsilon}{\alpha}$ | $c/t \leq \frac{10\varepsilon}{\alpha\sqrt{\alpha}}$ |
| ... | | | | |
| 3 | Cold formed and welded | $c/t \leq 14\varepsilon$ | $c/t \leq 21,0\varepsilon\sqrt{k_\sigma}$ For k_σ see EN 1993-1-5 | |
| <p style="text-align: center;"> https://standards.iteh.ai/catalog/standards/sist/d79e8840-2ef9-4b47-8d19-729e1d0e587b/sist-en-1993-1-4-2007-kfpr-a1-2014 </p> | | | | |

”

In Table 5.2 (sheet 3 of 3), replace Rows 4 and 9 with the following ones:

“

| Angles | | |
|------------------|---|---|
| ... | | |
| 3 | $h/t \leq 15\varepsilon : \frac{b+h}{2t} \leq 11,5\varepsilon$ | |
| Tubular sections | | |
| ... | | |
| 3 | $d/t \leq 280\varepsilon^2$ NOTE: For $d > 240$ mm and/or $d/t > 280\varepsilon^2$ see EN 1993-1-6. | $d/t \leq 90\varepsilon^2$ NOTE: For $d/t > 90\varepsilon^2$ see EN 1993-1-6. |
| ... | | |