

**SLOVENSKI STANDARD**  
**SIST EN 1999-1-1:2007/kFprA2:2013**  
**01-junij-2013**

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**Evrokod 9: Projektiranje konstrukcij iz aluminijevih zlitin - 1-1. del: Splošna pravila za konstrukcije**

Eurocode 9: Design of aluminium structures - Part 1-1: General structural rules

Eurocode 9: Bemessung und Konstruktion von Aluminiumtragwerken - Teil 1-1: Allgemeine Bemessungsregeln

Eurocode 9: Calcul des structures en aluminium - Partie 1-1: Règles générales

**Ta slovenski standard je istoveten z: EN 1999-1-1:2007/FprA2**

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**ICS:**

91.010.30	Tehnični vidiki	Technical aspects
91.080.10	Kovinske konstrukcije	Metal structures

**SIST EN 1999-1-1:2007/kFprA2:2013**      **en,fr,de**



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## Eurocode 9: Design of aluminium structures - Part 1-1: General structural rules

Eurocode 9: Calcul des structures en aluminium - Partie 1-1: Règles générales

Eurocode 9: Bemessung und Konstruktion von Aluminiumtragwerken - Teil 1-1: Allgemeine Bemessungsregeln

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 A2, if approved, will modify the European Standard EN 1999-1-1:2007. 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.

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**EN 1999-1-1:2007/FprA2:2013 (E)****Foreword**

This document (EN 1999-1-1:2007/FprA2:2013) 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.

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## 1 Modifications to 1.2.3.1

*Replace the title of 1.2.3.1 with "Chemical composition and temper definition of wrought products and technical delivery conditions".*

*Add:*

"EN 573-3            Aluminium and aluminium alloys - Chemical composition and form of wrought products - Part 3: Chemical composition and form of products".

*Add:*

"EN 515            Aluminium and aluminium alloys - Wrought products - Temper designations".

## 2 Modification to 1.2.4

*Add:*

"EN ISO 18273        Welding consumables - Wire electrodes, wires and rods for welding of aluminium and aluminium alloys - Classification (ISO 18273)".

## 3 Modification to 1.2.5

*At the beginning of the list, add:*

"EN ISO 6892        Metallic materials - Tensile testing (ISO 6892) (all parts)".

## 4 Modification to 1.3

*In Paragraph (1), add the following new hyphen:*

"

- The aluminium products should comply with EN 573 and the product standards listed in 1.2.3. The mechanical properties should comply with the tabulated values in Parts 2 of the product standards listed in 1.2.3."

## 5 Modifications to 1.6

*In Section 3, in the explanation for Symbol  $A_{50}$ , replace "EN 10 002" with "EN ISO 6892".*

*In Section 3, in the explanation for Symbol  $A$ , replace "EN 10 002" with "EN ISO 6892".*

*In Section 6, in Sub-section 6.2, after symbol  $A_{\text{eff}}$ , add:*

"

$A_{\text{u,eff}}$         effective cross section area allowing for local buckling and HAZ softening of transverse welds

".

**EN 1999-1-1:2007/FprA2:2013 (E)**

*In Section 6, in Sub-section 6.2, after symbol  $W_{\text{net}}$ , add:*

"

$W_{\text{u,eff}}$  section modulus allowing for local buckling and reduced thickness  $\rho_{\text{u,haz}} t$  in HAZ softening of transverse welds

".

*In Section 6, in Sub-section 6.3, delete the row defining " $\omega_0$ ".*

*In Section 6, in Sub-section 6.3, in the explanation for Symbol " $\kappa$ ", replace "welding" with "longitudinal welding".*

*In Section 6, in Sub-section 6.3, replace " $\xi_c$ " with " $\xi_{yc}, \xi_{zc}$ ".*

*In Section 6, in Sub-section 6.3, in the explanation for Symbols " $\omega_x, \omega_{x,LT}$ ", replace "factors for section with localized weld" with "factors for second order bending moments".*

*In Section 6, in Sub-section 6.3, after Symbols " $\omega_x, \omega_{x,LT}$ ", add:*

"

$\omega_{x,haz}, \omega_{x,LT,haz}$  factors for section with localised transverse weld

".

*In Annex B, replace " $I_{\text{eff}}$ " with " $I_{\text{eff}}$ ".*

*In Annex I, replace " $C_1, C_2, C_3, C_{1,1}, C_{12}$ " with " $C_1, C_2, C_3, C_{1,0}, C_{1,1}$ ".*

*In Annex J, in the NOTE, replace "given in J.4" with "given in J.4 and J.6".*

## **6 Modification to 3.2.1**

*In Paragraph (1), replace "the ENs listed in 1.2.3.1" with "EN 573-3 and tempers listed in Tables 3.2a, 3.2b and 3.2c conforming to EN 515".*

## **7 Modification to 3.2.2**

*In Table 3.2b, footnote 1), replace "1.2.1.3" with "1.2.3.2".*

## **8 Modification to 3.3.4**

*In Paragraph (1), replace "1.2.2" with "1.2.4" and delete the NOTE.*



## 9 Modification to 5.3.2

In Paragraph (11), before NOTE 1, add the following new NOTE:

"NOTE 1 In the general case the location of the cross section  $m$  is necessary to be obtained by an iterative procedure, because  $m$  is in the cross section where the function  $N_{Ed}(x) / N_{Rd}(x) + M_{\eta_{init}}^{II}(x) / M_{Rd}(x)$  achieves its maximum."

and renumber NOTES 1 to 3 as NOTES 2 to 4.

## 10 Modification to 5.4.1

In Paragraph (3), in NOTE 2, replace "6.4.3(2)" with "L.3(2)".

## 11 Modification to 6.1.6.2

In Paragraph (1) replace " $f_{a,haz}$ " with " $f_{u,haz}$ ".

## 12 Modifications to 6.2.3

In Paragraph (2), regarding Formula (6.19b), replace "HAZ" with "transverse weld" and replace " $N_{u,Rd} = A_{eff} f_u / \gamma_{M2}$ " with " $N_{u,Rd} = A_{u,eff} f_u / \gamma_{M2}$ ".

In Paragraph (2), on the last line, replace " $A_{eff}$ " with " $A_{u,eff}$ " and replace "area" with "cross-section area".

## 13 Modifications to 6.2.4

In Paragraph (2), on the 1<sup>st</sup> line, replace the 2<sup>nd</sup> occurrence of " $N_{c,Rd}$ " with " $N_{o,Rd}$ ".

In Paragraph (2), in List Entry a), replace "(6.21)" with "(6.21a)".

In Paragraph (2), after List Entry a), add the following new line:

"b) in sections with transverse weld  $N_{u,Rd} = A_{u,eff} f_u / \gamma_{M2}$  (6.21b)".

In Paragraph (2), regarding Formula (6.22), replace "b)" with "c)" and replace " $N_{c,Rd} = A_{eff} f_o / \gamma_{M1}$ " with " $N_{o,Rd} = A_{eff} f_o / \gamma_{M1}$ ".

In Paragraph (2), on the last line, after "softening", add "due to longitudinal welds".

At the end of Paragraph (2), add to the list of definitions:

" $A_{u,eff}$  is the effective section area, obtained using a reduced thickness  $\rho_c t$  for class 4 parts and reduced thickness  $\rho_{u,haz} t$  for the HAZ material, whichever is smaller."

## 14 Modifications to 6.2.5.1

In Paragraph (2), replace "(6.24)" with "(6.24a)".

## EN 1999-1-1:2007/FprA2:2013 (E)

Just before Formula (6.25), add the following new formula:

"

$$M_{u,Rd} = W_{u,eff} f_u / \gamma_{M2} \quad \text{in section with transverse weld} \quad (6.24b)$$

".

At the end of Paragraph (2), just above Table 6.4, add to the list of definitions:

"

$W_{u,eff}$  is the effective section modulus, obtained using a reduced thickness  $\rho_c t$  for class 4 parts and reduced thickness  $\rho_{u,haz} t$  for the HAZ material, whichever is smaller.

".

In Paragraph (2), in the last sentence, replace "value of  $\beta_2/\beta$ " with "value of  $\frac{\beta_3 - \beta}{\beta_3 - \beta_2}$ ".<sup>1)</sup>

## 15 Modification to 6.2.5.2

In Paragraph (2), in List Entry c), at the end of the paragraph, add the following sentence: "At a section with transverse weld  $\rho_{o,haz} t$  is replaced by  $\rho_{u,haz} t$ ".

## 16 Modifications to 6.2.9.1

In Paragraph (1), replace Formula (6.40) itself with " $\left( \frac{N_{Ed}}{N_{Rd}} \right)^{\xi_0} + \frac{M_{y,Ed}}{M_{y,Rd}} \leq 1,00$ ".

In Paragraph (1), replace Formula (6.41) itself with " $\left( \frac{N_{Ed}}{N_{Rd}} \right)^{\eta_0} + \left( \frac{M_{y,Ed}}{M_{y,Rd}} \right)^{\gamma_0} + \left( \frac{M_{z,Ed}}{M_{z,Rd}} \right)^{\xi_0} \leq 1,00$ " and replace the subsequent definition of  $N_{Rd}$  with the following one:

"

$N_{Rd}$  is axial force resistance according to 6.2.3 or 6.2.4 respectively".

In Paragraph (1), replace the two lines with definitions of  $M_{y,Rd}$  and  $M_{z,Rd}$  with the following definition:

"

$M_{y,Rd}$  and  $M_{z,Rd}$  are the bending moment resistances with respect to the y-y and z-z axes according to 6.2.5.

".

In Paragraph (1), in the definition of  $\alpha_y, \alpha_z$ , delete "with allowance for local buckling and HAZ softening from longitudinal welds".

1) This modification takes into account the following instruction regarding 6.2.5.1(2) from the stand-alone amendment EN 1999-1-1:2007/A1:2009: 'Paragraph "(2)", last line, replace " $\beta_2/\beta_3$ " with " $\beta_2/\beta$ ".'

In Paragraph (1), delete the definition of " $\omega_0$ ".

## 17 Modifications to 6.2.9.2

In Paragraph (1), replace Formula (6.43) itself with " $\left(\frac{N_{Ed}}{N_{Rd}}\right)^\psi + \left[\left(\frac{M_{y,Ed}}{M_{y,Rd}}\right)^{1,7} + \left(\frac{M_{z,Ed}}{M_{z,Rd}}\right)^{1,7}\right]^{0,6} \leq 1,00$ ".

In Paragraph (1), replace:

"where  $\psi = 1,3$  for hollow sections and  $\psi = 2$  for solid cross-sections. Alternatively  $\psi$  may be taken as  $\alpha_y \alpha_z$  but  $1 \leq \psi \leq 1,3$  for hollow sections and  $1 \leq \psi \leq 2$  for solid cross-sections

with:

"where for hollow sections  $\psi = 1,3$  for class 1 and class 2 cross sections and  $\psi = 1,0$  for class 3 and class 4 cross sections, or alternatively, for all classes of cross sections,  $\psi$  may be taken as  $\alpha_y \alpha_z$  but  $1 \leq \psi \leq 1,3$ . For solid sections  $\psi = 2$ .

## 18 Modification to 6.2.9.3

Replace Formula (6.44) itself with " $t_{eff} = \rho_{u,haz} t$ " and replace Formula (6.45) itself with " $t_{eff} = \rho_{o,haz} t$ ".

## 19 Modifications to 6.3.1.1

In Paragraph (2), at the end of the 1<sup>st</sup> line, replace "as:" with "as the lesser of:" and replace Formula (6.49) with the following one:

"

$$N_{b,Rd} = \kappa \chi \omega_x A_{eff} f_o / \gamma_{M1} \quad (6.49a)"$$

and add the new Formula (6.49b):

"

$$N_{b,Rd} = \chi_{haz} \omega_{x,haz} A_{u,eff} f_u / \gamma_{M2} \text{ in section with transverse weld} \quad (6.49b)".$$

In Paragraph (2), after the definition of  $\chi$ , add the following new definition:

"

$\chi_{haz}$  is the reduction factor based on  $\bar{\lambda}_{haz}$  according to 6.3.3.3(3)."

In Paragraph (2), replace the definition of " $\kappa$ " with: