
Eurocode 3: Projektiranje jeklenih konstrukcij - Del 3-1: Stolpi, jambori in dimniki - Stolpi in jambori (prevzet ENV 1993-3-1:1997 z metodo platnice)

Eurocode 3: Design of steel structures - Part 3-1: Towers, masts and chimneys - Towers and masts

Eurocode 3: Calcul des structures en acier - Partie 3-1: Tours, mâts et cheminées - Plyônes et mâts haubonnés

Eurocode 3: Bemessung und Konstruktion von Stahlbauten - Teil 3-1: Türme, Maste und Schornsteine - Türme und Maste

[SIST ENV 1993-3-1:2001](https://standards.iteh.ai/catalog/standards/sist/ca16f4fc-53ed-4f0f-85f0-bf7722c24b3b/sist-env-1993-3-1-2001)

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Deskriptorji: jeklene konstrukcije, konstrukcijska jekla, stolpi, projektiranje, predpisi za projektiranje konstrukcij, računanje

ICS 91.010.30; 91.080.10

Referenčna številka
SIST ENV 1993-3-1:2001 ((sl),en)

Nadaljevanje na straneh od II do V in od 1 do 93

NACIONALNI UVOD

Predstandard SIST ENV 1993-3-1 ((sl),en), Eurocode 3: Projektiranje jeklenih konstrukcij - Del 3-1: Stolpi, jambori in dimniki - Stolpi in jambori, prva izdaja, 2001, ima status slovenskega predstandarda in je z metodo platnice prevzet evropski predstandard ENV 1993-3-1 (en), Eurocode 3: Design of steel structures - Part 3-1: Towers, masts and chimneys - Towers and masts, December 1997.

NACIONALNI PREDGOVOR

Evropski predstandard ENV 1993-3-1:1997 je pripravil tehnični odbor Evropskega komiteja za standardizacijo CEN/TC 250 Konstrukcijski evrokodi.

Pripravo tega predstandarda sta CEN poverila Evropska komisija in Evropsko združenje za prosto trgovino.

Odločitev za prevzem tega predstandarda po metodi platnice je sprejela delovna skupina USM/TC KON/WG 3 Jeklene konstrukcije, ki je pripravila tudi nacionalni dokument za uporabo v Sloveniji, potrdil pa tehnični odbor USM/TC KON Konstrukcije.

Ta slovenski predstandard se lahko uporablja samo v skladu z nacionalnim dokumentom, ki je sestavni del SIST ENV 1993-3-1:2001.

Ta slovenski predstandard je dne 2000-12-04 odobril direktor USM.

Rok veljavnosti tega predstandarda je do izdaje evropskega standarda EN 1993-7-1.

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S prevzemom tega evropskega predstandarda veljajo za omejeni namen referenčnih standardov vsi standardi, navedeni v izvorniku, razen tistih, ki so že sprejeti kot nacionalni standardi:

SIST ENV 1991-1-1:1998	((sl),en)	Eurocode 1: Osnove projektiranja in vplivi na konstrukcije - del: Osnove projektiranja
SIST ENV 1991-2-1:1998	((sl),en)	Eurocode 1: Osnove projektiranja in vplivi na konstrukcije - Del 2-1: Vplivi na konstrukcije - Gostote, lastna teža in koristne obtežbe
SIST ENV 1991-2-3:1998	((sl),en)	Eurocode 1: Osnove projektiranja in vplivi na konstrukcije - Del 2-3: Vplivi na konstrukcije - Obtežbe snega
SIST ENV 1991-2-4:1998	((sl),en)	Eurocode 1: Osnove projektiranja in vplivi na konstrukcije - Del 2-4: Vplivi na konstrukcije - Vplivi vetra
SIST ENV 1993-1-1:1996	((sl),en)	Eurocode 3: Projektiranje jeklenih konstrukcij - Del 1-1: Splošna pravila in pravila za stavbe
SIST ENV 1993-1-1:1996/A1:1996	((sl),en)	Projektiranje jeklenih konstrukcij - Del 1-1: Splošna pravila in pravila za stavbe - Dodatka D in K
SIST ENV 1993-1-1:1996/A2:2001	((sl),en)	Projektiranje jeklenih konstrukcij - Del 1-1: Splošna pravila in pravila za stavbe - Dodatki G, H, J, N in Z
SIST ENV 1993-1-2:1999	((sl),en)	Projektiranje jeklenih konstrukcij - Del 1-2: Splošna pravila - Projektiranje požarnovarnih konstrukcij
SIST ENV 1993-1-3:2001	((sl),en)	Projektiranje jeklenih konstrukcij - Del 1-3: Splošna pravila - Dodatna pravila za hladnooblikovane tankostenske profile in pločevine

SIST ENV 1993-1-4:2001	((sl),en)	Projektiranje jeklenih konstrukcij - Del 1-4: Splošna pravila - Dodatna pravila za nerjavna jekla
SIST ENV 1993-1-5:2001	((sl),en)	Projektiranje jeklenih konstrukcij - Del 1-5: Splošna pravila - Dodatna pravila za ravninske pločevinaste konstrukcije (ortotropne plošče) brez prečne obremenitve
SIST ENV 1993-1-6:2001	((sl),en)	Projektiranje jeklenih konstrukcij - Del 1-6: Splošna pravila - Dodatna pravila za lupinaste konstrukcije
SIST ENV 1993-1-7:2001	((sl),en)	Projektiranje jeklenih konstrukcij - Del 1-7: Splošna pravila - Dodatna pravila za ravninske pločevinaste konstrukcije (ortotropne plošče), obremenjene s prečno obtežbo
SIST ENV 1993-2:2001	((sl),en)	Projektiranje jeklenih konstrukcij – 2. del: Jekleni mostovi
SIST ENV 1993-3-2:2001	((sl),en)	Projektiranje jeklenih konstrukcij - Del 3-2: Stolpi, jambori in dimniki - Dimniki
SIST ENV 1993-4-1:2001	((sl),en)	Projektiranje jeklenih konstrukcij - Del 4-1: Silosi, rezervoarji in cevovodi - Silosi
SIST ENV 1993-4-2:2001	((sl),en)	Projektiranje jeklenih konstrukcij - Del 4-2: Silosi, rezervoarji in cevovodi - Rezervoarji
SIST ENV 1993-4-3:2001	((sl),en)	Projektiranje jeklenih konstrukcij - Del 4-3: Silosi, rezervoarji in cevovodi - Cevovodi
SIST ENV 1993-5:2001	((sl),en)	Projektiranje jeklenih konstrukcij – 5. del: Piloti in zagatne stene
SIST ENV 1993-6:2001	((sl),en)	Projektiranje jeklenih konstrukcij – 6. del: Žerjavne proge

[SIST ENV 1993-3-1:2001](https://standards.iteh.ai/catalog/standards/sist/ca16f4fc-53ed-4f0f-85f0-bf7722c24b3b/sist-env-1993-3-1-2001)
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OPOMBI

- Povsod, kjer se v besedilu predstandarda uporablja izraz “evropski predstandard”, v SIST ENV 1993-3-1:2001 to pomeni “slovenski predstandard”.
- Nacionalni uvod in nacionalni predgovor nista sestavni del predstandarda.

VSEBINA

Stran

Nacionalni dokument za uporabo v Sloveniji	V
ENV 1993-3-1:1997	1

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SIST ENV 1993-3-1:2001

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Nacionalni dokument za uporabo v Sloveniji

Za vrednosti parametrov, podanih v okvirju (večinoma delni varnostni faktorji odpornosti ali zunanjih vplivov), se v SIST ENV 1993-3-1:2001 privzamejo priporočene vrednosti, podane v ENV 1993-3-1:1997.

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ICS 91.010.30; 91.080.10

Descriptors: steel construction, structural steels, tower, tower body, design, building codes, computation

English version

Eurocode 3: Design of steel structures - Part 3-1: Towers, masts and chimneys - Towers and masts

Eurocode 3: Calcul des structures en acier - Partie 3-1:
Tours, mâts et cheminées - Pylônes et masts haubonnés

Eurocode 3: Bemessung und Konstruktion von Stahlbauten
- Teil 3-1: Türme, Maste und Schornsteine - Türme und
Maste

This European Prestandard (ENV) was approved by CEN on 30 June 1997 as a prospective standard for provisional application.

The period of validity of this ENV is limited initially to three years. After two years the members of CEN will be requested to submit their comments, particularly on the question whether the ENV can be converted into a European Standard.

CEN members are required to announce the existence of this ENV in the same way as for an EN and to make the ENV available promptly at national level in an appropriate form. It is permissible to keep conflicting national standards in force (in parallel to the ENV) until the final decision about the possible conversion of the ENV into an EN is reached.

CEN members are the national standards bodies of Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and United Kingdom.

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

Central Secretariat: rue de Stassart, 36 B-1050 Brussels

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Foreword

Objectives of the Eurocodes

- (1) The "Structural Eurocodes" comprise a group of standards for the structural and geotechnical design of buildings and civil engineering works.
- (2) They cover execution and control only to the extent that is necessary to indicate the quality of the construction products, and the standard of the workmanship, needed to comply with the assumptions of the design rules.
- (3) Until the necessary set of harmonized technical specifications for products and for methods of testing their performance is available, some of the Structural Eurocodes cover some of these aspects in informative annexes.

Background to the Eurocode programme

- (4) The Commission of the European Communities (CEC) initiated the work of establishing a set of harmonized technical rules for the design of building and civil engineering works which would initially serve as an alternative to the different rules in force in the various member states and would ultimately replace them. These technical rules became known as the "Structural Eurocodes".
- (5) In 1990, after consulting their respective member states, the CEC transferred the work of further development, issue and updating of the Structural Eurocodes to CEN, and the EFTA Secretariat agreed to support the CEN work.

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- (6) CEN Technical Committee CEN/TC 250 is responsible for all Structural Eurocodes.

Eurocode programme

[SIST ENV 1993-3-1:2001](https://standards.iteh.ai/catalog/standards/sist/ca16f4fc-53ed-4f0f-85f0-bf7722c24b3b/sist-env-1993-3-1-2001)

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- (7) Work is in hand on the following Structural Eurocodes, each generally consisting of a number of parts:
 - EN 1991 Eurocode 1 Basis of design and actions on structures;
 - EN 1992 Eurocode 2 Design of concrete structures;
 - EN 1993 Eurocode 3 Design of steel structures;
 - EN 1994 Eurocode 4 Design of composite steel and concrete structures;
 - EN 1995 Eurocode 5 Design of timber structures;
 - EN 1996 Eurocode 6 Design of masonry structures;
 - EN 1997 Eurocode 7 Geotechnical design;
 - EN 1998 Eurocode 8 Design provisions for earthquake resistance of structures;
 - EN 1999 Eurocode 9 Design of aluminium alloy structures.
- (8) Separate sub-committees have been formed by CEN/TC 250 for the various Eurocodes listed above.
- (9) This Part 3.1 of Eurocode 3 is published by CEN as a European Prestandard (ENV) with an initial life of three years.
- (10) This Prestandard is intended for experimental application and for the submission of comments.
- (11) After approximately two years CEN members will be invited to submit formal comments to be taken into account in determining future actions.

(12) Meanwhile feedback and comments on this Prestandard should be sent to the secretariat of CEN/TC250/SC3 at the following address:

BSI Standards
British Standards House
389 Chiswick High Road
London W4 4AL
England

or to your national standards organization.

National Application Documents (NADs)

(13) In view of the responsibilities of the authorities in member countries for safety, health and other matters covered by the essential requirements of the Construction Products Directive (CPD), certain safety elements in this ENV have been assigned indicative values which are identified by ("boxed values"). The authorities in each member country are expected to review the "boxed values" and may substitute alternative definitive values for these safety elements for use in national application.

(14) Some of the supporting European or International Standards might not be available by the time this Prestandard is issued. It is therefore anticipated that a National Application Document (NAD) giving any substitute definitive values for safety elements, referencing compatible supporting standards and providing guidance on the national application of this Prestandard, will be issued by each member country or its Standards Organization.

(15) It is intended that this Prestandard is used in conjunction with the NAD valid in the country where the building or civil engineering works is located.

Matters specific to this Prestandard

- <https://standards.iteh.ai/catalog/standards/sist/ca16f4fc-53ed-4f0f-85f0-6c1110101010/sist-env-1993-3-1-2001>
- (16) The Parts of ENV 1993 that are currently envisaged are:
- ENV 1993-1-1 General rules and rules for buildings;
 - ENV 1993-1-2 Supplementary rules for structural fire design;
 - ENV 1993-1-3 Supplementary rules for cold formed thin gauge members and sheeting;
 - ENV 1993-1-4 Supplementary rules for stainless steels;
 - ENV 1993-1-5 Supplementary rules for the strength and stability of planar plated structures without transverse loading;
 - ENV 1993-1-6 Supplementary rules for the strength and stability of shell structures;
 - ENV 1993-1-7 Supplementary rules for the strength and stability of planar plated structures loaded transversely;
 - ENV 1993-2 Steel bridges;
 - ENV 1993-3-1 Towers and masts;
 - ENV 1993-3-2 Chimneys;
 - ENV 1993-4-1 Silos;
 - ENV 1993-4-2 Tanks;
 - ENV 1993-4-3 Pipelines;
 - ENV 1993-5 Piling;
 - ENV 1993-6 Crane supporting structures;

- ENV 1993-7 Marine and maritime structures;
- ENV 1993-8 Agricultural structures.

- (17) This Part 3.1 has been prepared in association with Part 3.2: Chimneys, in order to avoid overlap or duplication.
- (18) In the case of cylindrical masts reference is made to Part 3.2 for those aspects that are similar to chimneys.
- (19) Similarly Part 3.2 refers to this Part for the design of guys.
- (20) Fatigue rules are given in both Part 3.1 and Part 3.2 but Part 3.1 refers to Part 3.2 for certain details.
- (21) Annex A has been prepared to augment the provisions of ENV 1991-2-4 in respect of wind actions on lattice towers and guyed masts. It is expected that its contents will be transferred to EN 1991 at a future stage of development.
- (22) Reliability differentiation has been introduced with this Part 3.1 in the form of three classes, for use as agreed by competent national authorities in relation to economic and social consequences of failure.
- (23) This document has been prepared in consultation with CENELEC Committee TC11.
- (24) Provisions have been included to allow for the possible use of a different partial factor for resistance in the special case of product type towers constructed of angle sections, the design of which has been the subject of type testing.

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1 General

1.1 Scope

(1)P This Part 3.1 of ENV 1993 applies to the design of lattice towers and guyed masts. Provisions for the shafts of self-supporting and guyed cylindrical towers are given in Part 3.2 of ENV 1993. Provisions for the guys of guyed structures are given in this Part.

(2)P The provisions in this Part either supplement or modify those given in Part 1.

(3) Where the applicability of a provision is limited, for practical reasons or due to simplifications, its use is explained and the limits of applicability are stated.

(4) Details of the meteorological actions on lattice towers and guyed masts to be taken into account in design are given in annex A.

NOTE: This is an interim measure. It is expected that they will later be incorporated in ENV 1991.

(5) This Part does not cover the design of polygonal and circular lighting columns, which is covered in EN 40. Other polygonal towers are not covered in this Part.

(6) This Part does not cover special provisions for seismic design, which are given in ENV 1998-3.

(7) Special measures that might be necessary to limit the consequences of accidents are not covered in this Part. For resistance to fire, reference should be made to ENV 1993-1-2.

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1.2 Distinction between principles and application rules

SIST ENV 1993-3-1:2001

(1)P Depending on the character of the individual paragraphs, a distinction is made in this Part between principles and application rules.

(2)P The principles comprise:

- general or definitive statements for which there is no alternative;
- requirements and analytical models for which no alternative is permitted unless specifically stated.

(3) The principles are identified by the letter P following the paragraph number.

(4)P The application rules are generally recognized rules that follow the principles and satisfy their requirements. Alternative design rules different from the application rules given in the Eurocode may be used, provided that it is shown that the alternative rule accords with the relevant principles and has at least the same reliability.

(5) In this Part the application rules are identified by a number in brackets, as in this paragraph.

1.3 Normative references

This European Prestandard incorporates, by dated or undated reference, provisions from other publications. These normative references are cited at the appropriate places in the text and the publications are listed hereafter. For dated references, subsequent amendments to or revisions of any of these publications apply to this European Prestandard only when incorporated in it by amendment or revision. For undated references the latest edition of the publication referred to applies.

ENV 1991 *Eurocode 1: Basis of design and actions on structures:*

Part 1: *Basis of design;*

Part 2.1: *Densities, self-weight and imposed loads;*

Part 2.2: *Actions on structures exposed to fire;*

Part 2.3: *Snow loads;*

Part 2.4: *Wind loads;*

Part 2.5: *Thermal actions;*

ENV 1993 *Eurocode 3: Design of steel structures:*

Part 1.1: *General rules: General rules and rules for buildings;*

Part 1.2: *General rules: Supplementary rules for structural fire design;*

Part 1.3: *General rules: Supplementary rules for cold formed thin gauge members and sheeting;*

Part 1.4: *General rules: Supplementary rules for stainless steels;*

Part 1.5: *General rules: Supplementary rules for the strength and stability of planar plated structures without transverse loading;*

Part 1.6: *General rules: Supplementary rules for the strength and stability of shell structures;*

Part 1.7: *General rules: Supplementary rules for the strength and stability of planar plated structures loaded transversely;*

Part 3.2: *Chimneys.*

ENV 1998 *Eurocode 8: Earthquake resistant design of structures.*

ENV 1090 *Execution of steel structures*

ISO 1000 *Specification for SI units and recommendations for the use of their multiples and of certain other units.*

ISO 8930 *General principles on reliability of structures - List of equivalent terms.*

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SIST ENV 1993-3-1:2001

<https://standards.iteh.ai/catalog/standards/sist/ca16f4fc-53ed-4f0f-85f0-1911f2031201>

1.4 Definitions

(1) The terms that are defined in ENV 1991-1 for common use in the Structural Eurocodes apply to this Part 3.1 of ENV 1993.

(2) Unless otherwise stated, the definitions given in ISO 8930 also apply to this Part 3.1.

(3) Supplementary to Part 1 of ENV 1993, for the purposes of this Part 3.1, the following definition applies:

1.4.1 global analysis: The determination of a consistent set of internal forces and moments in a structure, that are in equilibrium with a particular set of actions on the structure.

1.5 Symbols

(1) In addition to those given in ENV 1993-1-1, the following main symbols are used:

G gust response factor

H horizontal load

K effective length factor

N buckling resistance of compression member, number of cycles

P load

R force

f solidity ratio

m	slope
r	force intensity
t	thickness
w	weight factor

(2) In addition to those given in ENV 1993-1-1, the following subscripts are used:

b	bolt, sub-panel length, buckling
c	reference
d	diagonal
dyn	dynamic
F	action
f	fatigue
g	guys
i	insulators
ice	ice
j	bolted angles
o	yield, build-up
red	reduced
s	stress concentration factor
stat	static
vec	reduction
W	wind

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[SIST ENV 1993-3-1:2001](https://standards.iteh.ai/catalog/standards/sist/ca16f4fc-53ed-4f0f-85f0-bf7722c24b3b/sist-env-1993-3-1-2001)

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(3) In addition to those used in ENV 1993-1-1, the following Greek symbols are used:

Λ	non-dimensional slenderness parameter
α	imperfection factor, angle of cone
β	factor for effective area
η	equivalence factor, reduction factor
ρ	factors for effective area
τ	basic slenderness ratio
ϕ	buckling factor, angle of friction
ε	coefficient

(4) Further symbols are defined where they first occur.

1.6 Units

(1)P S.I. units shall be used in accordance with ISO 1000.

(2) The following units are recommended for use in calculations:

- forces and loads: kN, kN/m, kN/m²;
- unit mass: kg/m³;