



SLOVENSKI STANDARD
oSIST prEN 1993-3:2024
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Evrokod 3 - Projektiranje jeklenih konstrukcij - 3. del: Stolpi, jambori in dimniki

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

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

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

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91.080.13	Jeklene konstrukcije	Steel structures

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

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

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

This draft European Standard is submitted to CEN members for enquiry. It has been drawn up by the Technical Committee CEN/TC 250.

If this draft becomes a European Standard, CEN members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration.

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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 foreword

This document (prEN 1993-2:2024) has been prepared by Technical Committee CEN/TC 250 “Structural Eurocodes”, the secretariat of which is held by BSI. CEN/TC 250 is responsible for all Structural Eurocodes and has been assigned responsibility for structural and geotechnical design matters by CEN.

This document is currently submitted to the CEN Enquiry.

This document will supersede EN 1993-3-1:2006, EN 1993-3-2:2006 and their corrigenda.

The first generation of EN Eurocodes was published between 2002 and 2007. This document forms part of the second generation of the Eurocodes, which have been prepared under Mandate M/515 issued to CEN by the European Commission and the European Free Trade Association.

The Eurocodes have been drafted to be used in conjunction with relevant execution, material, product and test standards, and to identify requirements for execution, materials, products and testing that are relied upon by the Eurocodes.

The Eurocodes recognize the responsibility of each Member State and have safeguarded their right to determine values related to regulatory safety matters at national level through the use of National Annexes.

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0 Introduction

0.1 Introduction to the Eurocodes

The Structural Eurocodes comprise the following standards generally consisting of a number of Parts:

- EN 1990, *Eurocode — Basis of structural and geotechnical design*
- EN 1991, *Eurocode 1 — 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 of structures for earthquake resistance*
- EN 1999, *Eurocode 9 — Design of aluminium structures*
- New parts are under development, e.g. Eurocode for design of structural glass

The Eurocodes are intended for use by designers, clients, manufacturers, constructors, relevant authorities (in exercising their duties in accordance with national or international regulations), educators, software developers, and committees drafting standards for related product, testing and execution standards.

NOTE Some aspects of design are most appropriately specified by relevant authorities or, where not specified, can be agreed on a project-specific basis between relevant parties such as designers and clients. The Eurocodes identify such aspects making explicit reference to relevant authorities and relevant parties.

0.2 Introduction to the EN 1993 series

(1) EN 1993 applies to the design of buildings and civil engineering works in steel. It complies with the principles and requirements for the safety and serviceability of structures, the basis of their design and verification that are given in EN 1990 — Basis of structural and geotechnical design.

(2) EN 1993 is concerned only with requirements for resistance, serviceability, durability and fire resistance of steel structures. Other requirements, e.g. concerning thermal or sound insulation, are not covered.

(3) EN 1993 is subdivided in various parts:

EN 1993-1, *Design of Steel Structures — Part 1: General rules and rules for buildings;*

EN 1993-2, *Design of Steel Structures — Part 2: Bridges;*

EN 1993-3, *Design of Steel Structures — Part 3: Towers, masts and chimneys;*

EN 1993-4, *Design of Steel Structures — Part 4: Silos and tanks;*

EN 1993-5, *Design of Steel Structures — Part 5: Piling;*

EN 1993-6, *Design of Steel Structures — Part 6: Crane supporting structures*;

EN 1993-7, *Design of steel structures — Part 7: Sandwich panels*.

(4) EN 1993-1 in itself does not exist as a physical document, but comprises the following 14 separate parts, the basic part being EN 1993-1-1:

EN 1993-1-1, *Design of Steel Structures — Part 1-1: General rules and rules for buildings*;

EN 1993-1-2, *Design of Steel Structures — Part 1-2: Structural fire design*;

EN 1993-1-3, *Design of Steel Structures — Part 1-3: Cold-formed members and sheeting*;

NOTE Cold formed hollow sections supplied according to EN 10219 are covered in EN 1993-1-1.

EN 1993-1-4, *Design of Steel Structures — Part 1-4: Stainless steel structures*;

EN 1993-1-5, *Design of Steel Structures — Part 1-5: Plated structural elements*;

EN 1993-1-6, *Design of Steel Structures — Part 1-6: Strength and stability of shell structures*;

EN 1993-1-7, *Design of Steel Structures — Part 1-7: Plate assemblies with elements under transverse loads*;

EN 1993-1-8, *Design of Steel Structures — Part 1-8: Joints*;

EN 1993-1-9, *Design of Steel Structures — Part 1-9: Fatigue*;

EN 1993-1-10, *Design of Steel Structures — Part 1-10: Material toughness and through-thickness properties*;

EN 1993-1-11, *Design of Steel Structures — Part 1-11: Tension components*;

EN 1993-1-12, *Design of Steel Structures — Part 1-12: Additional rules for steel grades up to S960*;

EN 1993-1-13, *Design of Steel Structures — Part 1-13: Beams with large web openings*;

EN 1993-1-14, *Design of Steel Structures — Part 1-14: Design assisted by finite element analysis*.

(5) All subsequent parts EN 1993-1-2 to EN 1993-1-14 treat general topics that are independent from the structural type like structural fire design, cold-formed members and sheeting, stainless steels, plated structural elements, etc.

(6) All subsequent parts numbered EN 1993-2 to EN 1993-7 treat topics relevant for a specific structural type like steel bridges, towers, masts and chimneys, silos and tanks, piling, crane supporting structures, etc. EN 1993-2 to EN 1993-7 refer to the generic rules in EN 1993-1 and supplement them.

0.3 Introduction to EN 1993-3

EN 1993-3 describes the principles and application rules for the safety, serviceability and durability of steel structures for towers, masts and chimneys.

EN 1993-3 gives design rules in supplement to the generic rules in the EN 1993-1 series.

EN 1993-3 is intended to be used with EN 1990, the EN 1991 series and the parts of EN 1992 to EN 1998 when steel structures or steel components for towers and masts, chimneys are referred to.

Matters that are already covered in those documents are not repeated.

EN 1993-3 is intended for use by

- committees drafting design related product, testing and execution standards,
- clients (e.g. for the formulation of their specific requirements),

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- designers and constructors,
- relevant authorities.

Numerical values for partial factors and other reliability parameters in EN 1993-3 are recommended as basic values that provide an acceptable level of reliability. They have been selected assuming that an appropriate level of workmanship and quality management applies.

Provisions have been included to allow for the possible use of a different partial factor for resistance in the case of those structures or elements the design of which has been the subject of an agreed type testing programme.

0.4 Verbal forms used in the Eurocodes

The verb “shall” expresses a requirement strictly to be followed and from which no deviation is permitted in order to comply with the Eurocodes.

The verb “should” expresses a highly recommended choice or course of action. Subject to national regulation and/or any relevant contractual provisions, alternative approaches could be used/adopted where technically justified.

The verb “may” expresses a course of action permissible within the limits of the Eurocodes.

The verb “can” expresses possibility and capability; it is used for statements of fact and clarification of concepts.

0.5 National Annex for EN 1993-3

National choice is allowed in this standard where explicitly stated within notes. National choice includes the selection of values for Nationally Determined Parameters (NDPs).

The national standard implementing EN 1993-3 can have a National Annex containing all national choices to be used for the design of buildings and civil engineering works to be constructed in the relevant country.

When no national choice is given, the default choice given in this standard is to be used.

When no national choice is made and no default is given in this standard, the choice can be specified by a relevant authority or, where not specified, agreed for a specific project by appropriate parties.

National choice is allowed in EN 1993-3 through notes to the following clauses:

4.1(3)	4.2.3(2)	6.3.1(2)	7.2(4)
7.4(4)	8.1(1)	8.2.4.1(7)	8.3.1(2)
8.3.3(2)	8.3.4.2(2)	10.3(5)	B.3.2(3)
B.3.3(3)	B.5.1(1)	B.5.2(3)	B.5.3(1)
B.5.4(1)	C.3(3)	C.5(8)	D.5(2)
E.4(5)	E.6.2.1(1)	E.6.2.2(3)	

National choice is allowed in EN 1993-3 on the application of the following informative annex:

Annex F

The National Annex can contain, directly or by reference, non-contradictory complementary information for ease of implementation, provided it does not alter any provisions of the Eurocodes.

1 Scope

(1) This document provides rules for structural design of towers, masts and chimney structures, that fall into any of the following classifications, with the exceptions given in (3), (4) and (5).

(2) This document is applicable to:

- a) self-supporting towers and guyed masts with or without attachments. The shafts of towers and masts can be of lattice type or of circular or polygonal cross-section.
- b) chimney structures of circular cross-section that are cantilevered, supported at intermediate levels or guyed.

NOTE 1 The structures are mainly exposed to wind loading.

NOTE 2 For overhead transmission line towers see also the EN 50341 series.

(3) This document does not apply to:

- a) polygonal and circular lighting columns covered by the EN 40 series;

NOTE The EN 40 series specifies the requirements and dimensions for lighting columns and it applies to post top columns not exceeding 20 m height and to post top lanterns and columns with brackets not exceeding 18 m height for side entry lanterns.

- b) wind turbine towers (see the EN 61400 series)

- c) overhead line towers covered by the EN 50341 series.

(4) This document does not cover special provisions for seismic design, which are given in the EN 1998 series.

(5) Special measures that might be necessary to limit the consequences of accidents are not covered in this document. For resistance to fire, see EN 1993-1-2.

(6) Provisions for the guys of guyed structures are given in EN 1993-1-11 and supplemented in this document.

(7) For provisions concerning aspects such as chemical attack, thermo-dynamical performance or thermal insulation of chimneys see EN 13084-1. For the design of liners see EN 13084-6.

NOTE 1 Foundations are covered in the EN 1997 series. See also EN 13084-1.

NOTE 2 Wind loads and procedures for the wind response of structures are specified in EN 1991-1-4.

Assumptions

(1) Unless specifically stated, EN 1990, EN 1991 (relevant parts) and EN 1993-1 (relevant parts) apply.

(2) The design methods given in this document are applicable if

- the execution quality is as specified in Annex E and EN 1090-2 and for the execution of chimneys, also in EN 13084-6,

and

- the construction materials and products used are as specified in the relevant parts of the EN 1993 series or, for materials other than steel, in the relevant material and product specifications.

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NOTE Execution is covered in this document to the extent that is necessary to indicate the quality of the construction materials and products and the standard of workmanship on site needed to comply with the assumptions of the design rules.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

NOTE See the Bibliography for a list of other documents cited that are not normative references, including those referenced as recommendations (i.e. through 'should' clauses) and permissions (i.e. through 'may' clauses).

EN 1090-2, *Execution of steel structures and aluminium structures — Part 2: Technical requirements for steel structures*

EN 1090-4, *Execution of steel structures and aluminium structures — Part 4: Technical requirements for cold-formed structural steel elements and cold-formed structures for roof, ceiling, floor and wall applications*

EN 1990:2023,¹ *Eurocode — Basis of structural and geotechnical design*

EN 1991 (all parts), *Eurocode 1 — Actions on structures*

EN 1993 (all parts), *Eurocode 3 — Design of steel structures*

EN 13084-9, *Free-standing chimneys — Part 9: Lifetime management — Monitoring, inspection, maintenance, remedial and reporting; Operations and actions required*

EN ISO 5817:2023, *Welding — Fusion-welded joints in steel, nickel, titanium and their alloys (beam welding excluded) — Quality levels for imperfections (ISO 5817:2023)*

3 Terms, definitions and symbols

3.1 Terms and definitions

For the purposes of this document, the terms in EN 1990 and EN 1993-1-1 and the following terms apply.

3.1.1

aerodynamic measures

surface features to forestall coordinated vortex shedding that could generate intolerable resonant oscillation

Note 1 to entry: Aerodynamic measures can be spoiler, helical strakes, shrouds or slats.

3.1.2

anchor bolt

bolt for the connection of the structure to the foundation

3.1.3

base plate

horizontal plate fixed to the base of a structural shell or shaft or leg

¹ As impacted by EN 1990:2023/prA1:2024

3.1.4**chimney**

construction work or building component that conducts waste gases, or other flue gases, supply or exhaust air to the atmosphere

Note 1 to entry: See also EN 13084-1. Where the term “chimney” is used in this standard, only the loadbearing part (structural shell) is meant.

3.1.5**damper**

device that supplements the structural damping and thus limits the response of a structure or of a guy

Note 1 to entry: This definition of damper refers to a vibration damper, which is different from a flow damper that is an internal gas flow regulation device in liners.

3.1.6**discrete ancillary item**

any non-structural component that is concentrated within a short vertical distance, such as dish reflectors, aerials, lighting, platforms, handrails, insulators and other items

3.1.7**double-wall chimney**

chimney consisting of an outer steel structural shell and one inner liner which carries the flue gases

3.1.8**flanges**

plate welded transverse to the member to enable connection to other members using bolts

Note 1 to entry: Flanges are used both between structural sections and in liners and the flanges are in contact with each other. For chimneys the term “flange” is referred to as “junction flange” in the EN 13084 series.

3.1.9**global analysis**

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

3.1.10**guy**

tension-only member providing lateral support in conjunction with two or more counterparts at the same level

Note 1 to entry: Guys are also known as stay. One guy with a termination at each end constitutes a guy assembly. The lower end of the guy assembly is anchored to the ground or on a structure and generally incorporates a means of adjusting the tension in the guy. Specific definitions of guys, their make-up and fittings, are specified in Annex B.

3.1.11**guyed structure**

steel structure stabilized at discrete intervals in its height by guys that are anchored to the ground or to a permanent structure

Note 1 to entry: The shaft of a guyed structure can be of lattice type or of circular or polygonal closed cross-section.

prEN 1993-3:2024 (E)**3.1.12****initial guy tension**

tension in the guy at its anchorage to the ground, in the absence of meteorological actions and at an agreed reference temperature

3.1.13**leg members**

steel members forming the main load-bearing components of the lattice structure

3.1.14**linear ancillary item**

any non-structural components that extend over several panels, such as waveguides, feeders, ladders and pipework

3.1.15**liner**

element supporting the lining system, contained within the structural shell

3.1.16**lining system**

total system separating the flue gases from the structural shell in a chimney

Note 1 to entry: This comprises a liner and its supports, the space between the liner and structural shell and insulation, where existing.

3.1.17**local analysis**

structural analysis of a part of the structure, including fatigue analysis

3.1.18**mast**

guyed steel structure

3.1.19**multi-flue chimney**

group of two or more chimneys structurally interconnected or a group of two or more liners within a structural shell

3.1.20**panel (of a tower or mast)**

any convenient portion of a lattice tower or mast of lattice type that is subdivided vertically for the purpose of determining projected areas and wind drag

Note 1 to entry: Panels are typically, but not necessarily, taken between intersections of legs and primary bracings.

3.1.21**primary bracing members**

members other than legs, carrying forces due to the loads imposed on the lattice structure