

**Euronorm 3: Terastarindite projekteerimine -
Osa 3-2: Tornid, mastid ja korstnad - Korstnad**

Eurocode 3: Design of steel structures - Part 3-2:
Towers, masts and chimneys - Chimneys

EESTI STANDARDI EESSÕNA

NATIONAL FOREWORD

Käesolev Eesti standard EVS-ENV 1993-3-2:1999 sisaldab Euroopa standardi ENV 1993-3-2:1997 ingliskeelset teksti.

Standard on kinnitatud Eesti Standardikeskuse 23.11.1999 käskkirjaga ja jõustub sellekohase teate avaldamisel EVS Teatajas.

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This Estonian standard EVS-ENV 1993-3-2:1999 consists of the English text of the European standard ENV 1993-3-2:1997.

This standard is ratified with the order of Estonian Centre for Standardisation dated 23.11.1999 and is endorsed with the notification published in the official bulletin of the Estonian national standardisation organisation.

The standard is available from Estonian standardisation organisation.

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English version

**Eurocode 3: Design of steel structures - Part 3-2: Towers, masts
and chimneys - Chimneys**

Eurocode 3: Calcul des structures en acier - Partie 3-2:
Tours, mâts et cheminées - Cheminées

Eurocode 3: Bemessung und Konstruktion von Stahlbauten
- Teil 3-2: Türme, Maste und Schornsteine - Schornsteine

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.



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

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

Eurocode programme

- (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 3.2 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

(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 3.2 has been prepared in association with Part 3.1: Towers and Masts, in order to avoid overlap or duplication.
- (18) In the case of guyed chimneys reference is made to Part 3.1 for those aspects that are similar to guyed masts.
- (19) Similarly Part 3.1 refers to this Part for the design of cylindrical masts.
- (20) Reliability differentiation has been introduced into this Part 3.2 in the form of three classes, for use as agreed by competent national authorities in relation to economic and social consequences of failure.
- (21) This document has been prepared in collaboration with Technical Committee CEN/TC297: Industrial Chimneys.
- (22) It is expected that during the ENV stage calibration exercises will be undertaken to justify, or otherwise, the numerical values for limiting cross-wind amplitudes for comparison with the results of calculations.

1 General

1.1 Scope

- (1)P This Part 3.2 of ENV 1993 applies to the structural design of vertical steel chimneys of circular or conical section. It covers chimneys that are cantilevered, supported at intermediate levels or guyed.
- (2)P The provisions in this Part either supplement or modify those given in Part 1.
- (3) This Part 3.2 is concerned only with the requirements for resistance (strength, stability and fatigue) of steel chimneys. For provisions concerning other aspects, such as chemical attack, thermodynamical performance or thermal insulation see EN .## [under preparation by TC 297; WG 1]. For the design of liners see EN .## [under preparation by TC297; WG3], and ENV 1993-1-6.
- (4) Foundations in reinforced concrete for steel chimneys are covered in ENV 1992 and ENV 1997.
- (5) Details of the meteorological actions on lattice towers and guyed masts to be taken into account in design are given in annex A of ENV 1993-3-1.
- (6) This Part does not cover special provisions for seismic design, which are given in ENV 1998-3.
- (7) Provisions for the guys and their attachments are given in ENV 1993-3-1.

1.2 Distinction between principles and application rules

- (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 1.4: *General rules: Supplementary rules for stainless steels*;

Part 1.5: *General rules: Supplementary rules for 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 structures loaded transversely*

Part 3.1: *Towers and Masts*

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

EN 10025 *Hot rolled products of non-alloy structural steels. Technical delivery conditions*

EN 10088 *Stainless steels*

EN 10113 *Hot-rolled products in weldable fine grain structural steels*

EN 10137 *Plates and wide flats made of high yield strength structural steels in the quenched and tempered or precipitation hardened conditions*

EN 10155 *Structural steels with improved atmospheric corrosion resistance. Technical delivery conditions.*

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

1.4 Definitions

(1) The terms that are defined in ENV 1991-1 for common use in the Structural Eurocodes apply to this Part 3.2 of ENV 1993.

(2) Unless otherwise stated, the definitions given in ISO 8930 also apply to this Part 3.2.

(3) Supplementary to Part 1 of ENV 1993, for the purposes of this Part 3.2, the following definitions apply:

1.4.1 chimney: Vertical construction works or building components that conduct waste gases, or other flue gases, supply or exhaust air to the atmosphere.

1.4.2 cantilevered chimney: A chimney whose supporting shaft is not connected with any other construction above the base level.

1.4.3 supported chimney: A chimney which is structurally supported at one or more height levels by a building or by any other bearing system.

1.4.4 guyed chimney: A chimney whose supporting shaft is held in place by guys at one or more height levels.