SLOVENSKI STANDARD
oSIST prEN 1990:2020

01-november-2020

Evrocode - Osnove projektiranja

Eurocode - Basis of structural and geotechnical design

Eurocode - Grundlagen der Tragwerksplanung

Eurocode - Bases des calculs structuraux et géotechniques

Ta slovenski standard je istoveten z: **prEN 1990**

ICS:

91.010.30	Tehnični vidiki	Technical aspects

oSIST prEN 1990:2020 **en,fr,de**

EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

DRAFT
prEN 1990

September 2020

ICS 91.010.30

Will supersede EN 1990:2002

English Version

Eurocode - Basis of structural and geotechnical design

Eurocode - Bases des calculs structuraux et géotechniques

Eurocode - Grundlagen der Tragwerksplanung

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.

This draft European Standard 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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Ref. No. prEN 1990:2020 E

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European foreword

This document (prEN 1990:2020) 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 1990:2002 and its amendments and 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.

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>

NOTE 1 The Structural Eurocodes are referred to as the Eurocodes in this document.

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 2 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 EN 1990

This document gives the principles and requirements for safety, serviceability, and durability of structures that are common to all Eurocodes parts and are to be applied when using them.

This document is addressed to all parties involved in construction activities (e.g. public authorities, clients, designers, contractors, producers, consultants, etc.).

0.3 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.

0.4 National Annex for EN 1990

National choices can be made where explicitly allowed by this standard within notes. Therefore, the National Standard implementing EN 1990 can have a National Annex containing all Nationally Determined Parameters to be used for the design of buildings and civil engineering works to be constructed in the relevant country.

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

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

National choice is allowed in EN 1990 through the following clauses:

— In main text through 4.2(3) Note 1, 4.3(1) Note 1 Table 4.1, 6.1.3.2(4) Notes 1 to 4, 6.1.3.2(6) Note, 7.1.5(7) Note, 8.3.3.1(5) Note, 8.3.4.2(2) Notes 1 and 2;

— In A.1 through A.1.2(1) Note 1 Table A.1.1, A.1.3(1) Note Table A.1.2, A.1.5.1(1) Table A.1.3, A.1.5.1(1) Notes 1 and 3, A.1.5.3(1) Note Table A.1.7, A.1.6(1) Note 1 Table A.1.8, Note 2 Table A.1.8 and Note 3 Table A.1.9, A.1.7.2.2(2) Note Table A.1.10, A.1.7.2.3(2) Note Table A.1.11, A.1.7.3(3) Note 1, A.1.7.3(4) Note, A.1.7.4(2) Note Table A.1.16, A.1.7.4(4) Note Table A.1.13, Table A.1.14 and Table A.1.15.

National choice is allowed in the informative annexes through the following clauses:

— In Annex B through B.4(2) Note Table B.1, B.5(1) Note Table B.2, B.6(1) Note, B.6(2) Note 2, B.7(1) Note 2 Table B.3, B.8(1) Note Table B.4;

— In Annex C through C.3.4.2(2) Note 1 Table C.3;

— In Annex D through D.4.1(1) Note;

— In Annex E through E.4(4) Note 1.

National choice is allowed in EN 1990 on the use of the following informative annexes:

— Annex B (informative) Technical management measures for design and execution;

— Annex C (informative) Reliability analysis and code calibration;

— Annex D (informative) Design assisted by testing;

— Annex E (informative) Additional guidance for enhancing the robustness of buildings and bridges;

— Annex F (informative) Rain-flow and reservoir counting methods for the determination of stress ranges due to high cycle fatigue.

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

1.1 Scope of EN 1990

(1) This document establishes principles and requirements for the safety, serviceability, robustness and durability of structures, including geotechnical structures, appropriate to the consequences of failure.

(2) This document is intended to be used in conjunction with the other Eurocodes for the design of buildings and civil engineering works, including temporary structures.

(3) This document describes the basis for structural and geotechnical design and verification according to the limit state principle.

(4) Design and verification in this document are based primarily on the partial factor method.

NOTE 1 Alternative methods are given in the other Eurocodes for specific applications.

NOTE 2 The Annexes to this document also provide general guidance concerning the use of alternative methods.

(5) This document is also applicable for:

— structural appraisal of existing construction;

— developing the design of repairs, improvements and alterations;

— assessing changes of use.

(6) This document is applicable for the design of structures where materials or actions outside the scope of EN 1991 to EN 1999 are involved.

NOTE In this case, additional or amended provisions can be necessary.

1.2 Assumptions

(1) It is assumed that reasonable skill and care appropriate to the circumstances is exercised in the design, based on the knowledge and good practice generally available at the time the structure is designed.

(2) It is assumed that the design of the structure is made by appropriately qualified and experienced personnel.

(3) The design rules provided in the Eurocodes assume that:

— execution will be carried out by personnel having appropriate skill and experience;

— adequate control and supervision will be provided during design and execution of the works, whether in factories, plants, or on site;

— construction materials and products will be used as specified in the Eurocodes, in the relevant product and execution standards, and project specifications;

— the structure will be adequately maintained;

— the structure will be used in accordance with the design assumptions.

NOTE Guidance on management measures to satisfy the assumptions for design and execution is given in Annex B.

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.

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

EN 1992 (all parts), *Eurocode 2: Design of concrete structures*

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

EN 1994 (all parts), *Eurocode 4: Design of composite steel and concrete structure*

EN 1995 (all parts), *Eurocode 5: Design of timber structures*

EN 1996 (all parts), *Eurocode 6: Design of masonry structures*

EN 1997 (all parts), *Eurocode 7: Geotechnical design*

EN 1998 (all parts), *Eurocode 8: Design of structures for earthquake resistance*

EN 1999 (all parts), *Eurocode 9: Design of aluminium structures*

3 Terms, definitions and symbols

3.1 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

NOTE Table 3.1 lists the terms defined hereafter in alphabetical order with reference to the number hereafter where they are defined (different table for each language).

Table 3.1 — Terms in alphabetical order with reference to reference numbers for definition

Term	Reference
accidental action	3.1.3.8
accidental design situation	3.1.2.5
accompanying action	3.1.3.24
action	3.1.3.1
basic variable	3.1.2.25
bounded action	3.1.3.13
characteristic value of a material or product property	3.1.4.1
characteristic value of an action	3.1.3.19
combination of actions	3.1.3.22
combination value of a variable action	3.1.3.25
consequence class	3.1.2.32
construction works	3.1.1.1

Term	Reference
contact non-linearity	3.1.6.8
design case	3.1.2.8
design criteria	3.1.2.1
design situation	3.1.2.2
design value of a geometrical property	3.1.5.2
design value of a material or product property	3.1.4.3
design value of an action	3.1.3.20
design service life	3.1.2.10
direct action	3.1.3.2
durability	3.1.2.30
dynamic action	3.1.3.16
effect of actions	3.1.3.4
excessive deformation	3.1.2.22
execution	3.1.1.7
fatigue action	3.1.3.7
fatigue design situation	3.1.2.7
fire design	3.1.2.9
first order theory	3.1.6.5
fixed action	3.1.3.11
free action	3.1.3.12
frequent value of a variable action	3.1.3 26
geometric non-linearity	3.1.6.4
geotechnical action	3.1.3.10
geotechnical structure	3.1.1.6
gross human error	3.1.2.33
ground	3.1.1.5
hazard	3.1.2.11
indirect action	3.1.3.3
irreversible serviceability limit state	3.1.2.17
leading action	3.1.2.22
limit state	3.1.2.14
linear behaviour	3.1.6.2
load arrangement	3.1.2.12
load case	3.1.2.13

Term	Reference
maintenance	3.1.2.26
material non-linearity	3.1.6.7
nominal value	3.1.2.28
nominal value of a geometrical property	3.1.5.1
non-linear behaviour	3.1.6.3
non-linearity of the limit state function	3.1.6.9
permanent action	3.1.3.5
persistent design situation	3.1.2.3
quasi-permanent value of a variable action	3.1.3.27
quasi-static action	3.1.3.17
reference period	3.1.3.21
reliability differentiation	3.1.2.24
repair	3.1.2.27
representative value of a material or product property	3.1.4.2
representative value of an action	3.1.3.18
resistance	3.1.2.20
reversible serviceability limit state	3.1.2.18
robustness	3.1.2.29
second order theory	3.1.6.6
seismic action	3.1.3.9
seismic design situation	3.1.2.6
serviceability criterion	3.1.2.19
serviceability limit state	3.1.2.16
single action	3.1.3.14
static action	3.1.3.15
strength	3.1.2.21
stress history	3.1.6.10
structural analysis	3.1.6.1
structural member	3.1.1.3
structural or geotechnical model	3.1.1.4
structural reliability	3.1.2.23
structure	3.1.1.2
sustainability	3.1.2.31
transient design situation	3.1.2.4

Term	Reference
ultimate limit state	3.1.2.15
variable action	3.1.3.6

3.1.1 Common terms used in the Eurocodes

3.1.1.1
construction works
everything that is constructed or results from construction operations

Note 1 to entry: The term covers both buildings and civil engineering works. It refers to the complete construction works comprising structural members, geotechnical elements and elements other than structural.

3.1.1.2
structure
part of the construction works that provides stability, resistance, and rigidity against various actions

Note 1 to entry: This definition includes structures that comprise one member or a combination of connected members.

3.1.1.3
structural member
physically distinguishable part of a structure, e.g. column, beam, plate, foundation

3.1.1.4
structural or geotechnical model
physical, mathematical, or numerical idealization of the structural or geotechnical system used for the purposes of analysis, design, and verification

3.1.1.5
ground
soil, rock and fill existing in place prior to the execution of construction works

[SOURCE: ISO 6707-1:2017, 3.4.2.1]

3.1.1.6
geotechnical structure
structure that includes ground or a structural member that relies on the ground for resistance

3.1.1.7
execution
all activities carried out for the physical completion of the work including procurement, the inspection and documentation thereof

Note 1 to entry: The term covers work on site; it can also signify the fabrication of parts off site and their subsequent erection on site.

3.1.2 Terms relating to design

3.1.2.1
design criteria
quantitative formulations describing the conditions to be fulfilled for each limit state

3.1.2.2
design situation
physical conditions that could occur during a certain time period for which it is to be demonstrated, with sufficient reliability, that relevant limit states are not exceeded

3.1.2.3
persistent design situation
normal condition of use or exposure of the structure

Note 1 to entry: The duration of a persistent design situation is of the same order as the design service life of the structure.

3.1.2.4
transient design situation
temporary conditions of use or exposure of the structure that are relevant during a period much shorter than the design service life of the structure

Note 1 to entry: A transient design situation refers to temporary conditions of the structure, of use, or exposure, e.g. during construction or repair or under dynamic loads.

3.1.2.5
accidental design situation
design situation in which the structure is subjected to exceptional events or exposure

Note 1 to entry: Caused by events such as fire, explosion, impact or local failure.

3.1.2.6
seismic design situation
design situation in which the structure is subjected to a seismic event

3.1.2.7
fatigue design situation
design situation in which the structure is subjected to repeated load or deformation induced stress cycles

3.1.2.8
design case
set of partial factors applied to actions or effects of actions for verification of a specific limit state

3.1.2.9
fire design
design of a structure to fulfil the required performance in case of fire

3.1.2.10
design service life
assumed period for which a structure or part of it is to be used for its intended purpose with anticipated maintenance but without major repair being necessary

3.1.2.11
hazard
unusual and severe event, e.g. an abnormal action or environmental influence, insufficient strength or stiffness, or excessive detrimental deviation from intended dimensions