SLOVENSKI STANDARD
SIST EN 1990:2023

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SIST EN 1990:2004
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SIST EN 1990:2004/A1:2006/AC:2010
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SIST EN 1997-1:2005/A1:2014
SIST EN 1997-1:2005/AC:2009

Evrokod - Osnove projektiranja konstrukcij in geotehničnega projektiranja

Eurocode - Basis of structural and geotechnical design

Eurocode - Grundlagen der Planung von Tragwerken und geotechnischen Bauwerken

Eurocodes - Bases des calculs structuraux et géotechniques

Ta slovenski standard je istoveten z: **EN 1990:2023**

ICS:

91.010.30	Tehnični vidiki	Technical aspects

SIST EN 1990:2023 **en,fr,de**

EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

EN 1990

March 2023

ICS 91.010.30

Supersedes EN 1990:2002, EN 1997-1:2004

English Version

Eurocode - Basis of structural and geotechnical design

Eurocodes - Bases des calculs structuraux et géotechniques

Eurocode - Grundlagen der Planung von Tragwerken und geotechnischen Bauwerken

This European Standard was approved by CEN on 2 January 2023.

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. Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the CEN-CENELEC Management Centre or to any CEN member.

This European Standard exists 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.

CEN members are the national standards bodies of Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Republic of North Macedonia, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Türkiye and United Kingdom.

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

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European foreword

This document (EN 1990:2023) 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 European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by September 2027 and conflicting national standards shall be withdrawn at the latest by March 2028.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN shall not be held responsible for identifying any or all such patent rights.

This document supersedes EN 1990:2002 and its amendments and corrigenda.

In comparison with the previous edition, the following main changes have been made:

— extension of scope to include provisions for bearings;

— improved approach for ULS verification;

— improved provisions on robustness;

— improved provisions on fatigue verification;

— improved provisions for basis of design for geotechnical structures in alignment with EN 1997;

— inclusion of provisions for sustainability;

— improved guidance on reliability analysis and code calibration;

— improved guidance for SLS verification of buildings related to deflection limits, vibrations and foundation movements;

— improved guidance on management of structural reliability of construction works;

— inclusion of guidance on verification of vibration of footbridges due to pedestrian traffic.

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.

Any feedback and questions on this document should be directed to the users’ national standards body. A complete listing of these bodies can be found on the CEN website.

According to the CEN-CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Republic of North Macedonia, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Türkiye and the United Kingdom.

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 EN 1990

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

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

The national standard implementing EN 1990 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 document is to be used.

When no national choice is made and no default is given in this document, 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 1990 through notes to the following:

4.2(3)	4.3(1)	4.4(2)	4.7(1)
6.1.3.2(4) – 3 choices	6.1.3.2(6)	7.1.5(7)	8.3.2.1(4)
8.3.3.1(5)	8.3.3.6(1)	8.3.4.2(2) – 2 choices	A.1.3(1)
A.1.4(1)	A.1.6.1(1) – 3 choices	A.1.6.1(2) – 2 choices	A.1.6.2(1)
A.1.6.3(1)	A.1.6.3(2)	A.1.7(1) – 2 choices	A.1.8.1(1)
A.1.8.2.2(2)	A.1.8.2.3(2)	A.1.8.3(1)	A.1.8.3(3)
A.1.8.3(4)	A.1.8.4(2)	A.1.8.4(4) – 3 choices	A.2.3(1)
A.2.4(1)	A.2.7.1(1) – 3 choices	A.2.7.3.6(1)	A.2.7.4.1(1) – 2 choices
A.2.7.4.3(1)	A.2.7.4.5(1)	A.2.7.4.6(1) – 2 choices	A.2.7.5.1(1)
A.2.7.5.3(1)	A.2.7.5.4(1) – 2 choices	A.2.7.6.1(1)	A.2.7.6.4(1)
A.2.7.10(5) – 2 choices	A.2.7.10(9)	A.2.8(1) – 3 choices	A.2.9.1(1)
A.2.9.3.1(5)	A.2.9.3.3(1)	A.2.9.3.3(3)	A.2.9.3.3(4)
A.2.9.4.1(1) – 2 choices	A.2.9.4.2.1(3)	A.2.9.4.2.2(4)	A.2.9.4.2.2(5)
A.2.9.4.2.3(1)	A.2.9.4.2.3(2)	A.2.9.4.2.4(2) – 2 choices	A.2.9.4.2.4(4)
A.2.9.5(1)	A.2.10(1)	A.2.11.1(9)	A.2.11.4.5(3)
A.2.11.4.7(1)	B.2(1)	B.4(2)	B.5(1)
B.6(1)	B.6(2)	B.7(1)	B.8(1)
C.3.1(5)	C.3.4.2(3)	D.4.1(1)	E.4(4)
G.2(1)	G.3.1(6)	G.3.3.2(1)	G.3.3.2(2)
G.3.4(2)	G.3.4(3)	G.6(2)	G.7.1.2(2)
G.7.1.3(2)	G.7.3.2(2)	G.7.4.2(1)	G.7.5.1(1)
G.7.5.2(1) – 2 choices			

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

Annex B	Annex C	Annex D	Annex E
Annex F	Annex H		

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) The verification methods 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 assessment of existing structures;

— developing the design of repairs, improvements and alterations;

— assessing changes of use.

NOTE Additional or amended provisions can be necessary.

(6) This document is applicable for the design of structures where materials or actions outside the scope of EN 1991 (all parts) to EN 1999 (all parts) 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 in accordance with 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.

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

EN 1337-3, *Structural bearings - Part 3: Elastomeric bearings*

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

EN 1991-2:—[1], *Eurocode 1: Actions on structures - Part 2: Traffic loads on bridges and other civil engineering works*

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.

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.

[1] Under preparation. Stage at the time of publication: prEN 1991-2:2021.

3.1.1.2
structure
part of the construction works that provides stability, resistance, and rigidity, to meet the safety, serviceability and durability requirements

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 6707-1:2020, 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
elements other than structural
completion and finishing elements connected with the structure that are not classified as structural members and that have the lowest consequence of failure

Note 1 to entry: See 4.3 for the classification of consequences of failure.

EXAMPLE Roofing; surfacing and coverings; partitions and linings; kerbs; wall cladding; suspended ceilings; thermal insulation; bridge furniture, road surfacing; services fixed permanently to, or within, the structure such as equipment for lifts and moving stairways; heating, ventilating and air conditioning equipment; electrical equipment; pipes; cable trunking and conduits.

3.1.1.8
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.

3.1.1.9
quality
degree to which a set of inherent characteristics of an object fulfils requirements

Note 1 to entry: The term “quality” can be used with adjectives such as poor, good or excellent.

Note 2 to entry: “Inherent”, as opposed to “assigned”, means existing in the object.

[SOURCE: EN ISO 9000:2015, 3.6.2]

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 expected to 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.

3.1.2.5
fundamental design situation
design situation that is either a persistent or a transient design situation

3.1.2.6
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.

3.1.2.7
seismic design situation
design situation in which the structure is subjected to a seismic event

3.1.2.8
fatigue design situation
design situation where fatigue actions may cause fatigue failure

Note 1 to entry: For some materials, a distinction applies between low and high cycle fatigue. The other Eurocodes give guidance, where relevant.

3.1.2.9
verification case
classification of load cases for fundamental design situations in ultimate limit states, for which a set of partial factors is defined

3.1.2.10
fire design
design of a structure to fulfil the required performance in case of fire