



SLOVENSKI STANDARD

oSIST prEN 1997-1:2022

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Evrokod 7 - Geotehnično projektiranje - 1. del: Splošna pravila

Eurocode 7: Geotechnical design - Part 1: General rules

Eurocode 7: Entwurf, Berechnung und Bemessung in der Geotechnik - Teil 1: Allgemeine Regeln

Eurocode 7 : Calcul géotechnique - Partie 1 : règles générales

Ta slovenski standard je istoveten z: prEN 1997-1

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Eurocode 7: Geotechnical design - Part 1: General rules

Eurocode 7: Calcul géotechnique - Partie 1: Règles
générales

Eurocode 7: Entwurf, Berechnung und Bemessung in
der Geotechnik - Teil 1: Allgemeine Regeln

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 COMMITTEE FOR STANDARDIZATION
COMITÉ EUROPÉEN DE NORMALISATION
EUROPÄISCHES KOMITEE FÜR NORMUNG

CEN-CENELEC Management Centre: Rue de la Science 23, B-1040 Brussels

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prEN 1997-1:2022 (E)**European foreword**

This document (prEN 1997-1:2022) 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 will partially supersede EN 1997-1:2004. Some content is migrated into prEN 1990:2021.

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 EN 1997 Eurocode 7

EN 1997 consists of a number of parts:

- EN 1997-1, *Geotechnical design – Part 1: General rules*
- EN 1997-2, *Geotechnical design – Part 2: Ground properties*
- EN 1997-3, *Geotechnical design – Part 3: Geotechnical structures*

EN 1997 standards establish additional principles and requirements to those given in EN 1990 for the safety, serviceability, robustness, and durability of geotechnical structures.

Design and verification in EN 1997 (all parts) are based on the partial factor method or other reliability-based methods, prescriptive rules, testing, or the observational method.

prEN 1997-1:2022 (E)

0.3 Introduction to prEN 1997-1

prEN 1997-1 establish additional principles and requirements to those given in EN 1990 for the safety, serviceability, robustness, and durability of geotechnical structures.

Design and verification in prEN 1997-1:2022 are based on the partial factor method, prescriptive rules, testing, or the observational method.

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 prEN 1997-1

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 prEN 1997-1:2022 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 prEN 1997-1:2022 through the following clauses:

3.1	Table 3.1	4.1.2.2	Table 4.1
4.1.2.3	Table 4.2	4.1.3	Table 4.3
4.1.8	Table 4.4	4.2.3	Table 4.5
4.2.4	Table 4.6	4.4.3	Table 4.7
4.4.3	Table 4.8	7.1.2	Table 7.1
8.2	Table 8.1	12.1	Table 12.1
A.4	Table A.2	A.4	Table A.3
D.3	Table D.1	E.3	Table E.1
E.3	Table E.2		

National choice is allowed in prEN 1997-1:2022 on the application of the following informative annexes:

Annex A

Annex B

Annex D

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.

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prEN 1997-1:2022 (E)**1 Scope****1.1 Scope of prEN 1997-1**

- (1) This document provides general rules for the design and verification of geotechnical structures.
- (2) This document is applicable for the design and verification of geotechnical structures outside the scope of prEN 1997-3:2022.

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

1.2 Assumptions

(1) In addition to the assumptions given in prEN 1990:2021, the provisions of prEN 1997:2022 (all parts) assume that:

- ground investigations are planned by personnel or enterprises knowledgeable about potential ground and groundwater conditions;
- ground investigations are executed by personnel having appropriate skill and experience;
- evaluation of test results and derivation of ground properties from ground investigation are carried out by personnel with appropriate geotechnical experience and qualifications;
- data required for design are collected, recorded, and interpreted by appropriately qualified and experienced personnel;
- geotechnical structures are designed and verified by personnel with appropriate qualifications and experience in geotechnical design;
- adequate continuity and communication exist between the personnel involved in data-collection, design, verification and execution.

(2) This document is intended to be used in conjunction with prEN 1990:2021, which establishes principles and requirements for the safety, serviceability, robustness, and durability of structures, including geotechnical structures, and other construction works.

(3) This document is intended to be used in conjunction with prEN 1997-2, which gives provisions rules for determining ground properties from ground investigations.

(4) This document is intended to be used in conjunction with prEN 1997-3, which gives specific rules for the design and verification of certain types of geotechnical structures.

(5) This document is intended to be used in conjunction with the other Eurocodes for the design of geotechnical structures, including temporary geotechnical structures.

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 (i.e. in 'may' clauses), possibilities (i.e. in 'can' clauses), and in notes.

EN 206, *Concrete - Specification, performance, production and conformity*

prEN 1990:2021, *Eurocode - Basis of structural and geotechnical design*

prEN 1991-2:2021, *Eurocode 1: Actions on structures*

prEN 1992-1-1:2021 *Eurocode 2: Design of concrete structures - Part 1-1: General rules, rules for buildings, bridges and civil engineering structures*

prEN 1993-1-1:2020, *Eurocode 3: Design of steel structures - Part 1-1: General rules and rules for buildings*

prEN 1993-5, *Eurocode 3: Design of steel structures - Part 5: Piling*

prEN 1995-1-1, *Eurocode 5: Design of timber structures - Part 1-1: General - Common rules and rules for buildings*

prEN 1996 (all parts), *Eurocode 6 Design and masonry structures*

prEN 1997-2:2022, *Eurocode 7: Geotechnical design - Part 2: Ground properties*

prEN 1997-3:2022, *Eurocode 7: Geotechnical design - Part 3: Geotechnical structures*

3 Terms, definitions and symbols

3.1 Terms and definitions

For the purposes of this document, the terms and definitions given in prEN 1990:2021 and the following apply.

3.1.1 Terms relating to the ground

3.1.1.1

ground

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

[SOURCE: prEN 1990:2021]

3.1.1.2

soil

aggregate of minerals and/or organic materials including fills which can be disaggregated by hand in water

[SOURCE: EN ISO 14688]

prEN 1997-1:2022 (E)**3.1.1.3****rock**

naturally occurring assemblage or aggregate of mineral grains, crystals or mineral based particles compacted, cemented, or otherwise bound together and which cannot be disaggregated by hand in water

[SOURCE: EN ISO 14689]

3.1.1.4**rock mass**

rock comprising the intact material together with the discontinuities and weathering zones

[SOURCE: EN ISO 14689]

3.1.1.5**rock material (intact rock)**

intact rock between the discontinuities

[SOURCE: EN ISO 14689]

3.1.1.6**weathering zone**

distinctive layer of weathered ground material, differing physically, chemically, and/or mineralogically from the layers above and/or below

3.1.1.7**discontinuities**

bedding planes, joints, fissures, faults and shear planes

[SOURCE: EN ISO 14688]

3.1.1.8**foliation**

planar arrangements of constituents such as crystals in any type of rock, especially the parallel structure that results from flattening, segregation and other processes undergone by the grains in a metamorphic rock in geology refers to repetitive layering in metamorphic rocks

[SOURCE: EN ISO 14689]

3.1.1.9**interface**

surface where two systems of ground interact or surface where ground and structure interact

3.1.1.10**infill**

material that fills or is used to fill a space, hole or discontinuity

3.1.1.12**fill (or made ground)**

ground that has been formed by using material to fill in a depression or to raise the level of a site

[SOURCE: EN ISO 14689]

3.1.1.12**engineered fill**

material placed in a controlled manner to ensure that its geotechnical properties conform to a predetermined specification

3.1.1.13**non-engineered fill**

material placed with no compaction control and likely to have heterogeneous and anisotropic geotechnical properties within its mass

3.1.2 Terms relating to geotechnical reliability**3.1.2.1****desk study**

analysis of information about the construction site from existing documentation

Note 1 to entry: A desk study includes, for example, the history of the site, observations of neighbouring structures, previous construction activities, information from aerial photographs, satellite observations, local experience in the area, and seismicity

Note 2 to entry: See also prEN 1997-2:2022, Annex B

3.1.2.2**Geotechnical Complexity Class**

classification of a geotechnical structure on the basis of the complexity of the ground and ground-structure interaction, taking account of prior knowledge

3.1.2.3**comparable experience**

documented previous information about ground and structural behaviour that is considered relevant for design, as established by geological, geotechnical and structural similitude with the design situation

3.1.3 Terms relating to ground properties**3.1.3.1****ground property**

physical, mechanical, geometrical, or chemical attribute of a ground material

[SOURCE: modified from ISO 6707-1]

3.1.3.2**derived value of a ground property**

value of a ground property obtained by theory, correlation or empiricism from test results or field measurements

3.1.3.3**nominal value of a ground property**

cautious estimate of the value of a ground property that affects the occurrence of a limit state

Note 1 to entry: Further explanation of 'cautious estimate' is given in 4.3.2.

prEN 1997-1:2022 (E)**3.1.3.4****characteristic value of a ground property**

statistical determination of the value of a ground property that affects the occurrence of a limit state having a prescribed probability of not being attained

Note 1 to entry: This value corresponds to a specified fractile (mean, superior or inferior) of the assumed statistical distribution of the particular property of the ground.

3.1.3.5**representative value of a ground property**

nominal or characteristic value including the conversion factor

Note 1 to entry: Further explanation on representative value is given in 4.3.2.

3.1.3.6**best estimate value of a ground property**

estimate of the most probable value of a ground property

Note 1 to entry: Further explanation about best estimate value is given in 4.3.2.

3.1.4 Terms relating to actions and resistance**3.1.4.1****ground resistance**

capacity of the ground, or part of it, to withstand actions without failure

3.1.4.2**ground strength**

mechanical property of the ground indicating its ability to resist actions

3.1.4.3**overall stability**

failure mechanism in the ground that encompasses the entire geotechnical structure

3.1.4.4**local stability**

failure mechanism that encompasses only a certain part of the entire geotechnical structure without failure of the entire geotechnical structure

3.1.4.5**cyclic actions**

variable load that can induce significant stiffness and strength degradation, generation of excess pore pressure, liquefaction, or permanent settlements

3.1.4.6**creep**

increase in strain during sustained load

[SOURCE: ISO 6707-1]

3.1.5 Terms relating to verification methods

3.1.5.1

Observational Method (-)

continuous, managed, integrated process of design; construction control, monitoring and review that enables previously defined modifications to be incorporated during or after construction as appropriate

[SOURCE: CIRIA Report 185, 1999]

3.1.5.2

prescriptive rules

pre-determined, experienced-based, and suitably conservative rules for design

3.1.5.3

verification assisted by testing

testing of a structural element to verify design ground properties or resistance

Note 1 to entry: Verification assisted by testing includes, the determination of shaft friction and end bearing of piles; pull-out strength of anchors; and shear strength of lime-cement columns, for example.

3.1.5.4

verification by testing

testing performed to verify that the performance of the geotechnical structure (or part of the structure) is within the limiting values

Note 1 to entry: Verification by testing includes full-scale or reduced-scale tests.

3.1.5.5

design variant

describes the anticipated behaviour of the geotechnical structure, given that the relevant ground properties lie in a predefined range

3.1.6 Terms relating to analysis and models

3.1.6.1

zone of influence

zone where construction works or the geotechnical structure can induce adversely affects in terms of safety, serviceability, robustness, durability or sustainability on the geotechnical structure itself, other structures, utilities, ground, or groundwater

3.1.6.2

geotechnical analysis

procedure or algorithm for determining effects-of-actions in and resistance of the ground

3.1.6.3

geotechnical system

term describing the ground and the structure interacting with it

3.1.6.4

Geotechnical Design Model

conceptual representation of the site derived from the ground model for the verification of each appropriate design situation and limit state

Note 1 to entry: Guidance on the contents of a Geotechnical Design Model are given in Clause 12 and Annex C.