SLOVENSKI STANDARD
SIST ENV 1997-2:2004

01-september-2004

Eurocode 7: Geotehniļ no projektiranje - 2. del: Projektiranje s pomoļ jo preskuġanja v laboratoriju

Eurocode 7: Geotechnical design - Part 2: Design assisted by laboratory testing

Eurocode 7: Entwurf, Berechnung und Bemessung in der Geotechnik - Teil 2: Laborversuche für die geotechnische Bemessung

Eurocode 7: Calcul géotechnique - Partie 2: Calcul sur la base d'essais de laboratoire

Ta slovenski standard je istoveten z: ENV 1997-2:1999

ICS:

91.010.30	Tehniļ ni vidiki	Technical aspects
93.020	Zemeljska dela. Izkopavanja. Gradnja temeljev. Dela pod zemljo	Earthworks. Excavations. Foundation construction. Underground works

SIST ENV 1997-2:2004 **en**

EUROPEAN PRESTANDARD

PRÉNORME EUROPÉENNE

EUROPÄISCHE VORNORM

ENV 1997-2

April 1999

ICS 91.060.00; 91.120.20

English version

Eurocode 7: Geotechnical design - Part 2: Design assisted by laboratory testing

Eurocode 7: Calcul géotechnique - Partie 2: Calcul sur la base d'essais de laboratoire

Eurocode 7: Entwurf, Berechnung und Bemessung in der Geotechnik - Teil 2: Laborversuche für die geotechnische Bemessung

This European Prestandard (ENV) was approved by CEN on 30 August 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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Ref. No. ENV 1997-2:1999 E

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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 are intended to serve as reference documents for the following purposes:

(a) As a means to prove compliance of building and civil engineering works with the essential requirements of the Construction Products Directive (CPD)
(b) As a framework for drawing up harmonised technical specifications for construction products.

(3) 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.

(4) Until the necessary set of harmonised 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

(5) The Commission of the European Communities (CEC) initiated the work of establishing a set of harmonised 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".

(6) In 1990, after consulting their respective Member States, the CEC transferred work of further development, issue and updates of the Structural Eurocodes to CEN and the EFTA Secretariat agreed to support the CEN work.

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

Eurocode programme

(8) Work is in hand on the following Structural Eurocodes, each generally consisting of a number of parts:

EN 1990 Eurocode 0 Basis of 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 alloy structures

(9) Separate sub-committees have been formed by CEN/TC 250 for the various Eurocodes listed above.

(10) This part of the Structural Eurocode for Geotechnical design, is being issued by CEN as a European prestandard (ENV) with an initial life of three years.

(11) This prestandard is intended for experimental practical application in the design of the building and civil engineering works covered by the scope as given in 1.1.2 and for the submission of comments.

(12) After approximately two years CEN members will be invited to submit formal comments to be taken into account in determining future action.

(13) Meanwhile, feedback and comments on this prestandard should be sent to the Secretariat of sub-committee CEN/TC250/SC7 at the following address:

NNI
P.O.Box 5059
NL-2600 GB Delft
The Netherlands

or to a national standards organisation.

National application documents

(14) In view of the responsibilities of authorities in member countries for the safety, health and other matters covered by the essential requirements of the CPD, certain safety elements in this ENV have been assigned indicative values which are identified by [ ]. The authorities in each member country are expected to assign definitive values to these safety elements.

(16) Many of the supporting standards, including those giving values for actions to be taken into account and measures required for fire protection, will not be available by the time this prestandard is issued. It is therefore anticipated that a National Application Document giving definitive values for safety elements, referencing compatible supporting standards and giving national guidance on the application of this prestandard will be issued by each Member State or its Standards Organisation. This prestandard should be used in conjunction with the National Application Document valid in the country where the building and civil engineering works is to be constructed.

Matters specific to this prestandard

(16) This prestandard is intended to serve as a reference document for the use of laboratory tests for geotechnical design. It covers the execution and interpretation of the most commonly used laboratory tests. The prestandard aims at ensuring that adequate quality is reached in the execution of laboratory tests and their interpretation.

(17) Within the framework of European Standardisation, Eurocode 7 Part 1 on the design of geotechnical structures was established. The link between the design requirements in Part 1 and the results of laboratory tests run according to standards, codes and other accepted documents are covered by Part 2 «Geotechnical Design Assisted by Laboratory

Testing». Eurocode 7 Part 2 addresses in particular the requirements of Section 3 in Part 1, «Geotechnical data».

(18) ENV 1997-2 and ENV 1997-3 are complementary.

(19) No other standard covering to the extent of the present document the use of laboratory tests for geotechnical design has been published before. Some existing standards cover part of the material described in the present document. Various national standards on laboratory test procedures however have been published.

(20) CEN/TC 250/SC7 defined the scope for this part of Eurocode 7 in the following manner:

- the document should represent a prestandard for professional behaviour within the field of design assisted by laboratory testing.
- the requirements for the interpretation of the test results should include the «derived» values of the soil parameters and not the characteristic values.
- the document should only give those requirements that are essential to obtain reliable derived values of soil parameters; test procedures are to be presented elsewhere; the present document is a step towards a global set of standards including test procedures, interpretation and selection of characteristic values.

(21) Laboratory tests as such are not within the scope of this prestandard. This prestandard consists of a main text (Sections 1 to 15) and an informative annex (Sections A1 to A15). The main text contains the requirements and the aspects for each laboratory test method. The informative annex contains information which is useful for practical work, but which may not be as generally recognised in the member countries as the concepts in the main text.

(22) Section 2 contains general requirements applicable to all laboratory tests covered, section 3 covers calibration requirements. Sections 4 to 11 cover the requirements for laboratory testing of soils, with section 4 covering the preparation of soil specimens and sections 5 to 11 treating each laboratory test separately. Sections 12 to 15 cover the requirements for the laboratory testing of rocks, with section 12 covering the preparation of rock specimens for testing and sections 13 to 15 treating each laboratory test separately.

(23) The informative annex A with the same numeration system for the sections as the main text (Sections A.2 to A.15 correspond to Sections 2 to 15 in the main text) gives additional information on principles of measurement, testing procedures, minimum number of tests and reporting and interpretation.

(24) There are no European or ISO standards on laboratory testing procedures at the moment. Until standards on testing procedures have been completed, the informative annex contains a list of standards, prestandards and other publicly available documents that comply with the requirements of this prestandard.

In the annex, wherever possible, checklists and tables are provided to assist with planning, checking and interpretation of laboratory tests. The annex is by no means an exhaustive listing of all possible issues that may arise but points out important aspects to be considered.

1 GENERAL

1.1 Scope

1.1.1 Scope of Eurocode 7

(1)P Eurocode 7 applies to the geotechnical aspects of the design of buildings and civil engineering works. It is subdivided into various separate parts, (see 1.1.2).

(2)P Eurocode 7 is concerned with the requirements for strength, stability, serviceability and durability of structures. Other requirements, e.g. concerning thermal or sound insulation, are not considered.

(3)P Eurocode 7 shall be used in conjunction with ENV 1991-1 "Basis of Design" of Eurocode 1 "Basis of Design and Actions on Structures" which establishes the principles and requirements for safety and serviceability, describes the basis for design and verification and gives guidelines for related aspects of structural reliability.

(4)P Eurocode 7 gives the rules to calculate actions originating from the ground such as earth pressures. Numerical values of actions on buildings and civil engineering works to be taken into account in the design are provided in ENV 1991 Eurocode 1 "Basis of Design and Actions on Structures" applicable to the various types of construction.

(5)P In Eurocode 7 execution is covered to the extent that is necessary to indicate the quality of the construction materials and products which should be used and the standard of workmanship on site needed to comply with the assumptions of the design rules. Generally, the rules related to execution and workmanship are to be considered as minimum requirements which may have to be further developed for particular types of buildings or civil engineering works and methods of construction.

(6)P Eurocode 7 does not cover the special requirements of seismic design. Eurocode 8, "Design provisions for earthquake resistance of structures" provides additional rules for seismic design which complete or adapt the rules of Eurocode 7.

1.1.2 Scope of ENV 1997-2

(1)P This prestandard provides requirements for the execution, interpretation and use of geotechnical laboratory tests. The standard aims at providing assistance for the geotechnical design of structures. It does not replace national test standards on testing procedures.

(2) The provisions of this document are planned primarily for projects of Geotechnical Category 2, as defined in 2.1 of ENV 1997-1.

(3)P ENV 1997-2 shall be used in conjunction with ENV 1997-1.

(4) For each of the laboratory tests included, this prestandard presents the objective and the requirements of the test. The requirements are related to test programme, test apparatus and testing procedures, and the evaluation and presentation of the test results.

(4) Only commonly used geotechnical laboratory tests are covered in this prestandard. These were selected on the basis of their importance in geotechnical practice, availability in commercial geotechnical laboratories and existence of an accepted testing procedure in Europe. Tests less commonly used, especially more advanced tests, which may be essential for design of structures within Geotechnical
Category 3, as defined in 2.1 of ENV 1997-1, are mentioned in connection with related tests. Unsaturated soils are not covered. The parameters needed for e.g. finite element calculations (Poisson's ratio, shear modulus and Young's modulus) are not dealt with either. It is expected that updates of the present prestandard will gradually include more advanced laboratory tests, unsaturated soils and deformation parameters.

(5) This document is meant for the person responsible for a geotechnical design.

1.2 References

(1)P This European prestandard incorporates by dated or undated reference, provisions from other standards. 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 prestandard only when incorporated in it by amendment or revision.

ENV 1991-1:1994	Eurocode 1 Basis of design and actions on structures - Part 1 Basis of design
ENV 1997-1:1994	Eurocode 7 Geotechnical design - Part 1 General rules
ENV 1997-3:1998	Eurocode 7 Geotechnical design - Part 3 Design assisted by field testing

1.3 Distinction between Principles and Application Rules

(1)P Depending on the character of the individual paragraphs, distinction is made in this prestandard between Principles and Application Rules.

(2)P The Principles comprise:

- general statements and definitions for which there is no alternative, as well as;
- requirements and analytical models for which no alternative is permitted unless specifically stated.

(3)P The Principles are preceded by the letter P.

(4)P The Application Rules are examples of generally recognised rules which follow the Principles and satisfy their requirements.

(5)P It is permissible to use alternative rules different from the Application Rules given in this Eurocode, provided it is shown that the alternative rules accord with the relevant Principles.

1.4 Definitions

1.4.1 Terms common to all Eurocodes

(1)P The terms used in common for all Eurocodes are defined in ENV 1991-1 Basis of design.

1.4.2 Terms common to Eurocode 7

(1)P For terms, specific to Eurocode 7, reference is made to 1.5.2 of ENV 1997-1.

(2)P The following terms, used in this part of Eurocode 7, in addition to, or replacing the terms defined in 1.5.2 of ENV 1997-1, are defined here:

1.4.2.1 comparable experience: defined in 1.4 of ENV 1997-1. In addition three classes of comparable experience are defined:

- **none:** if no reliable results are available,
- **medium:** if data for similar soils are available or if data follow knowledge documented in geotechnical literature
- **extensive:** if statistical evaluations and/or published correlations, or if testresults for the same soil on a nearby location, exist

1.4.2.2 derived value: derived value of a geotechnical property is the value obtained by theory, correlation or empiricism from test results. Derived values form the basis for the selection of characteristic values of ground properties to be used for the design of geotechnical structures in accordance with 2.4.3 in ENV 1997-1.

1.4.2.3 disturbed sample: sample where the structure, water content and constituents of the soil have been changed during sampling.

1.4.2.4.element test: test on an element (specimen) of soil to determine a property, where the element is subjected to deformations, forces or percolation attempting to simulate the in situ conditions of a soil mass.

1.4.2.5 measured value: value is the value measured in a test.

1.4.2.6 normally consolidated soil: soil which state is on the virgin normal compression line.

1.4.2.7 overconsolidated soil: soil which state is below the virgin normal compression line.

1.4.2.8 quality class: classification by which the quality of a soil sample is assessed. For laboratory testing purposes, soil samples are classified in five Quality Classes, where Quality Class 1 represents an undisturbed sample, and Quality Class 5 a sample not suitable for representative testing.

1.4.2.9 remoulded specimen: fully disturbed specimen, at about natural water content.

1.4.2.10 re-compacted specimen: specimen forced into a mould with a rammer or under static pressure.