



SLOVENSKI STANDARD SIST ENV 1997-3:2004

01-september-2004

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Eurocode 7: Geotechnical design - Part 3: Design assisted by field testing

Eurocode 7: Entwurf, Berechnung und Bemessung in der Geotechnik - Teil 3:
Felduntersuchungen für die geotechnische Bemessung

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Eurocode 7: Calcul géotechnique (Partie 3: Calcul sur la base d'essais en place
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Ta slovenski standard je istoveten z: **ENV 1997-3:1999**

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ICS:

91.010.30	V^@ã}ããããã	Technical aspects
93.020	Zemeljska dela. Izkopavanja. Gradnja temeljev. Dela pod zemljo	Earthworks. Excavations. Foundation construction. Underground works

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EUROPEAN PRESTANDARD
PRÉNORME EUROPÉENNE
EUROPÄISCHE VORNORM

ENV 1997-3

July 1999

ICS 91.080.01; 93.020

English version

Eurocode 7: Geotechnical design - Part 3: Design assisted by fieldtesting

Eurocode 7: Calcul géotechnique - Partie 3: Calcul sur la base d'essais en place

Eurocode 7: Entwurf, Berechnung und Bemessung in der Geotechnik - Teil 3: Felduntersuchungen für die geotechnische Bemessung

This European Prestandard (ENV) was approved by CEN on 30 July 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.

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

Central Secretariat: rue de Stassart, 36 B-1050 Brussels

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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 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 of structures for earthquake resistance
EN 1999 Eurocode 9 Design of aluminium alloy structures.

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(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.

(15) 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 Standard 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. It is intended that this Prestandard is used in conjunction with the NAD valid in the country where the building or civil engineering works are located.

Matters specific to this prestandard

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

(17) In the framework of European Standardization, Eurocode 7 Part 1 on design of geotechnical structures has been established. The link between the general requirements for the design such as stated in ENV 1997-1 and the existing standards, codes and other types of generally accepted documents for operating field investigations is covered by Eurocode 7 Part 3: "Geotechnical design assisted by field tests". Eurocode 7 Part 3 in particular addresses some of the requirements of ENV 1997 - Part 1, especially section 3: "Geotechnical data".

(18) ENV 1997-3 does not replace standards for equipment and performance of different test methods, but provides basic requirements for such standards.

(19) Section 2 of ENV 1997-3 gives general requirements with respect to planning of field and laboratory investigations. This section serves as a common section of both Eurocode 7 Parts 2 and 3.

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 the 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 Eurocode 1 "Basis of Design and Actions on Structures". Part 1: "Basis of Design", 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 this prestandard.

1.1.2 Scope of ENV 1997-3

(1)P In addition to ENV 1997-1 the scope of ENV 1997-3 is to provide for a number of commonly used field tests:

- a) requirements for the equipment and test procedures;
- b) requirements for the reporting and the presentation of test results;
- c) interpretation of test results.

(2)P Part 3 shall serve as a link between the design requirements of Part 1 and the results of a number of field tests. Therefore part of the scope is to give:

- d) examples on how to derive values of geotechnical parameters from the test results.

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

1.1.3 Limitations

(1)P The derivation of parameter values is dedicated primarily to the design of pile and spread foundations as elaborated in the annexes B, C, D, and E of ENV 1997-1.

(2)P The scope of ENV 1997-3 does not cover the following:

- the assessment of characteristic values;
- environmental geotechnics, chemical investigations or the environmental impact of structures;
- geohydrological tests e.g. pumping tests.

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 constructsures Part 1 Basis of design
ENV 1997-1:1994	Eurocode 7 Geotechnical design Part 1 General rules ENV 1997-2:1998 Eurocode 7 Geotechnical design Part 2 Design assisted by laboratory testing
ISO 3898:1997	Basis for design of structures. Notations. General symbols

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.

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1.4 Definitions

1.4.1 Definitions common to all Eurocodes

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

1.4.2 Definitions used in Eurocode 7

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

1.4.3 Definitions used in ENV 1997-3

(1) In sections 3 to 14 specific definitions relating to that section are given.

(2) For the purpose of this prestandard the following terms apply:

1.4.3.1 derived value: value of a geotechnical parameter 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 of ENV 1997-1.

1.4.3.1.1 Concept of derived values

(1) The concept of 'derived values' is elaborated as a way to link test results to geotechnical parameters. From the test results the values for geotechnical parameters for the use in analytical methods and coefficients for the use in semi-empirical or direct methods may be arrived at through:

— results of field tests	-----> through correlations -->	<u>to geotechnical parameter values</u>
	----->	<u>to coefficients in direct methods</u>
— results of lab. tests	----->	<u>to geotechnical parameter values</u>
	-----> through correlations with other tests ----->	<u>to geotechnical parameter values</u>

These values of the geotechnical parameters and/or coefficients, arrived at through, for example correlations, are called 'derived values'.

(2) ENV 1997-3 provides a set of examples of derived values for geotechnical parameters. From this the characteristic and the design values according to the requirements of ENV 1997-1 have to be established.

(3) The concept of 'derived values' is as follows: assume a homogeneous zone of ground governing the behaviour of a geotechnical structure. Assume that two types of field tests are carried out (see Fig. 1.1): five Cone Penetration Tests (CPT) and five pressuremeter tests (gives P_{LM}), and assume five laboratory tests to establish the undrained shear strength. From the five (over the depth of the layer averaged) CPT values and P_{LM} values from pressuremeter tests, the following sets of derived values are established through certain correlations with the undrained shear strength:

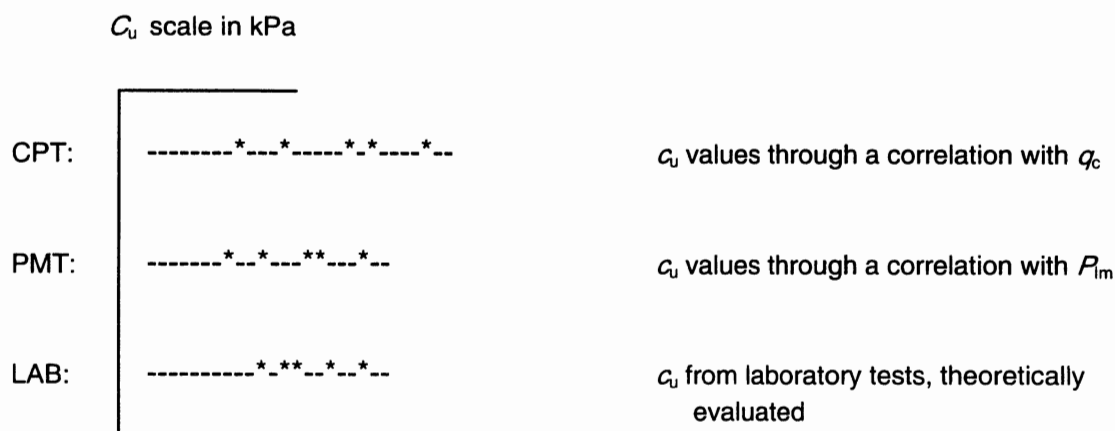


Figure 1.1 Concept of derived values

(4) From these three sets of derived values for the undrained shear strength of a homogeneous soil mass, the characteristic value to be used in the design has to be assessed.

1.4.3.1.2 Correlations

(1) The examples in the annexes, to subclauses #.7 of this prestandard, are based on various correlations obtained from the literature. These correlations may correlate a geotechnical parameter derived value either with a measured value, for example the q_c -value of a CPT, or with a corrected value, for example the q_t -value of a CPTU being the q_c -value corrected for the measured excess pore pressure.

(2) Apart from this, the correlation may connect a geotechnical parameter derived value either with the mean value of the measured/corrected value or a conservative estimate of the measured/corrected value (see Fig 1.2).

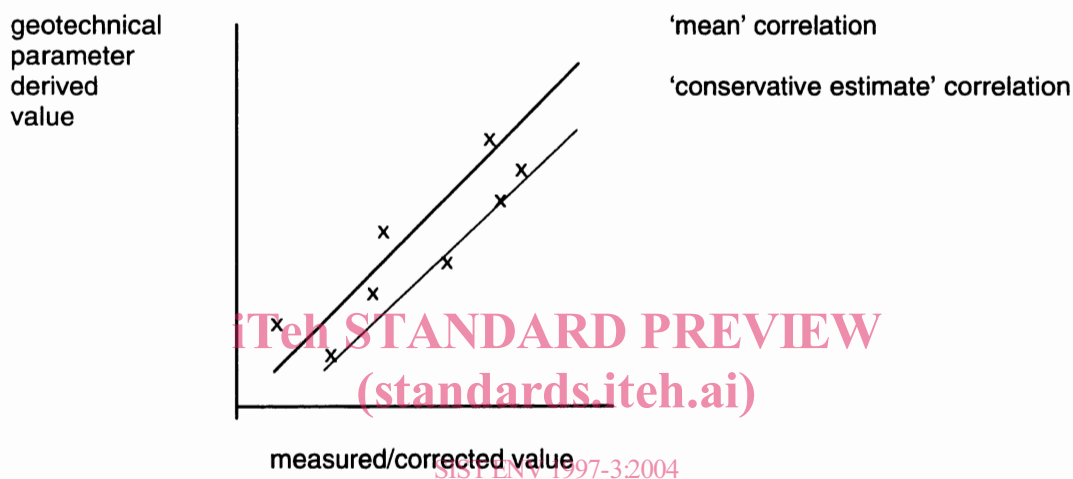


Figure 1.2 Types of correlation