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**EUROCODE 7: GEOTECHNICAL DESIGN -  
PART 2: DESIGN ASSISTED BY  
LABORATORY TESTING**

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EUROPEAN PRESTANDARD  
PRÉNORME EUROPÉENNE  
EUROPÄISCHE VORNORM

**ENV 1997-2**

April 1999

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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  
EUROPAISCHES KOMITEE FÜR NORMUNG

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	page
<b>FOREWORD</b>	<b>8</b>
<b>1 GENERAL</b>	<b>11</b>
1.1 Scope	11
1.1.1 Scope of Eurocode 7	11
1.1.2 Scope of ENV 1997-2	11
1.2 References	12
1.3 Distinction between Principles and Application Rules	12
1.4 Definitions	13
1.4.1 Terms common to all Eurocodes	13
1.4.2 Terms common to Eurocode 7	13
1.5 Symbols and units	14
1.5.1 Symbols common to all Eurocodes	14
1.5.2 Symbols used in Eurocode 7	14
1.5.3 Units	14
1.6 The link between ENV 1997-1 and ENV 1997-2	15
<b>2 REQUIREMENTS FOR ALL LABORATORY TESTS</b>	<b>16</b>
2.1 General requirements	16
2.2 Testing programme	16
2.3 Quality of soil samples	17
2.4 Equipment, procedures and presentation	18
2.5 Evaluation of test results	18
2.6 Quality assurance and quality control	19
<b>3 CALIBRATION OF TEST EQUIPMENT</b>	<b>20</b>
3.1 Objective	20
3.2 Requirements	20
3.2.1 Measuring instruments	20
3.2.2 Test apparatus	20
3.2.3 Malfunction of equipment	21
3.2.4 Environment	21
<b>4 PREPARATION OF SOIL SPECIMENS FOR TESTING</b>	<b>22</b>
4.1 Objective	22
4.2 Requirements	22
4.2.1 Quantity of soil	22
4.2.2 Handling and processing	22
<b>5 TESTS FOR CLASSIFICATION, IDENTIFICATION AND DESCRIPTION OF SOILS</b>	<b>23</b>
5.1 General	23
5.2 Requirements for all classification tests	23
5.3 Water content	23
5.3.1 Objective	23
5.3.2 Requirements	23
5.3.3 Evaluation of test results	24
5.4 Bulk density	24
5.4.1 Objective	24
5.4.2 Requirements	24
5.4.3 Evaluation of test results	24
5.5 Particle density	25
5.5.1 Objective	25
5.5.2 Requirements	25
5.5.3 Evaluation of test results	25
5.6 Particle size analysis	25
5.6.1 Objective	25
5.6.2 Requirements	25
5.6.3 Evaluation of test results	26
5.7 Consistency limits	26

5.7.1	Objective	26
5.7.2	Requirements	26
5.8	Density index test for granular soils	26
5.8.1	Objective	26
5.8.2	Requirements	27
5.8.3	Evaluation of test results	27
5.9	Soil dispersibility	27
5.9.1	Objective	27
5.9.2	Requirements	28
5.10	Frost susceptibility	28
5.10.1	Objective	28
5.10.2	Requirements	28
5.11	Evaluation of test results	29
<b>6</b>	<b>CHEMICAL TESTING OF SOILS AND GROUNDWATER</b>	<b>30</b>
6.1	Requirements for all chemical tests	30
6.1.1	Scope	30
6.1.2	Objective	30
6.1.3	Requirements	30
6.1.4	Evaluation of test results	31
6.2	Organic content	31
6.2.1	Objective	31
6.2.2	Requirements	31
6.2.3	Evaluation of test results	32
6.3	Carbonate content	32
6.3.1	Objective	32
6.3.2	Requirements	32
6.3.3	Evaluation of tests results	32
6.4	Sulphate content	32
6.4.1	Objective	32
6.4.2	Requirements	33
6.4.3	Evaluation of test results	33
6.5	pH value (acidity and alkalinity)	33
6.5.1	Objective	33
6.5.2	Requirements	33
6.5.3	Evaluation of test results	34
6.6	Chloride content	34
6.6.1	Objective	34
6.6.2	Requirements	34
6.6.3	Evaluation of test results	34
<b>7</b>	<b>COMPRESSIBILITY TESTING OF SOILS</b>	<b>35</b>
7.1	Objective	35
7.2	Requirements	35
7.3	Evaluation of test results	36
<b>8</b>	<b>STRENGTH INDEX TESTING OF SOILS</b>	<b>37</b>
8.1	Objective	37
8.2	Requirements	37
8.3	Evaluation of test results	37
<b>9</b>	<b>STRENGTH TESTING OF SOILS</b>	<b>38</b>
9.1	Objective and scope	38
9.2	Requirements	38
9.3	Evaluation of test results	39
9.4	Consolidated triaxial compression test	40
9.4.1	Requirements	40
9.4.2	Evaluation of test results	40
9.5	Consolidated box and ring direct shear tests	41
<b>10</b>	<b>COMPACTION TESTING OF SOILS</b>	<b>42</b>
10.1	Scope	42

Page 4  
ENV 1997-2:1999

10.2	Compaction tests	42
10.2.1	Objective	42
10.2.2	Requirements	42
10.2.3	Evaluation of test results	42
10.3	California Bearing ratio (CBR) test	43
10.3.1	Objective	43
10.3.2	Requirements	43
10.3.3	Evaluation of test results	43
<b>11</b>	<b>PERMEABILITY TESTING OF SOILS</b>	<b>44</b>
11.1	Objective	44
11.2	Requirements	44
11.3	Evaluation of test results	45
<b>12</b>	<b>PREPARATION OF SPECIMEN FOR TESTING OF ROCK MATERIAL</b>	<b>46</b>
12.1	Objective	46
12.2	Requirements	46
12.3	Evaluation of test results	47
<b>13</b>	<b>CLASSIFICATION TESTING OF ROCK MATERIAL</b>	<b>48</b>
13.1	General	48
13.1.1	Objective	48
13.1.2	Requirements	48
13.2	Rock identification and description	48
13.2.1	Objective	48
13.2.2	Requirements	49
13.3	Water content	49
13.3.1	Objective	49
13.3.2	Requirements	49
13.3.3	Evaluation of test results	49
13.4	Density and porosity	50
13.4.1	Objective	50
13.4.2	Requirements	50
<b>14</b>	<b>SWELLING TESTING OF ROCK MATERIAL</b>	<b>51</b>
14.1	General	51
14.1.1	Objective	51
14.1.2	Requirements	51
14.1.3	Evaluation of test results	52
14.2	Swelling pressure index under zero volume change	52
14.2.1	Objective	52
14.2.2	Requirements	52
14.3	Swelling strain index for radially confined specimen with axial surcharge	52
14.4	Swelling strain developed in unconfined rock specimen	53
<b>15</b>	<b>STRENGTH TESTING OF ROCK MATERIAL</b>	<b>54</b>
15.1	General	54
15.1.1	Scope	54
15.1.2	Requirements	54
15.1.3	Evaluation of test results	54
15.2	Uniaxial Compressive Strength and Deformability	55
15.2.1	Objective	55
15.2.2	Requirements	55
15.2.3	Evaluation of test results	55
15.3	Point load test	55
15.3.1	Objective	55
15.3.2	Requirements	55
15.3.3	Evaluation of test results	55
15.4	Direct shear test	56
15.4.1	Objective	56
15.4.2	Requirements	56
15.4.3	Evaluation of test results	56

15.5	Brazil test	56
15.5.1	Objective	56
15.5.2	Requirements	56
15.5.3	Evaluation of test results	57
15.6	Triaxial compression test	57
15.6.1	Objective	57
15.6.2	Requirements	57
15.6.3	Evaluation of test results	57
<b>ANNEX A (INFORMATIVE) DETAILED INFORMATION ON METHODS AND TESTS</b>		<b>58</b>
<b>A.1</b>	<b>GENERAL</b>	<b>58</b>
A.1.1	Scope	58
A.2	REQUIREMENTS FOR ALL LABORATORY TESTS	60
A.2.1	General requirements	60
A.2.2	Testing programme	60
A.2.3	Quality of soil samples	60
A.2.3.1	Classification testing	62
A.2.3.2	Test specifications	62
A.2.3.3	Number of tests	62
A.2.4	Evaluation of test results	62
<b>A.3</b>	<b>CALIBRATION OF TEST EQUIPMENT</b>	<b>63</b>
A.3.1	General	63
A.3.2	Calibration of measuring instruments	63
A.3.3	Calibration and checking of test equipment	65
A.3.4	In-house calibration	66
<b>A.4</b>	<b>PREPARATION OF SOIL SPECIMENS FOR TESTING</b>	<b>67</b>
A.4.1	Procedure	67
A.4.2	Preparation of disturbed soil for testing	67
A.4.2.1	Drying of soil	67
A.4.2.2	Disaggregation	67
A.4.2.3	Subdividing	68
A.4.2.4	Mass of disturbed soil for testing	68
A.4.2.5	Preparation of soil for compaction	68
A.4.3	Preparation of undisturbed specimens	68
A.4.4	Preparation of recompacted specimens	71
A.4.4.1	General requirements	71
A.4.4.2	Recompacted sample larger than test specimen	71
A.4.4.3	Recompaction of test specimen	72
A.4.4.4	Re-saturation	72
A.4.4.5	Remoulded test specimen	72
A.4.5	Preparation of reconstituted specimens	73
A.4.5.1	Preparation of slurry	73
A.4.5.2	Consolidation	73
A.4.5.3	Specimen preparation	73
<b>A.5</b>	<b>TESTS FOR CLASSIFICATION, IDENTIFICATION AND DESCRIPTION OF SOILS</b>	<b>73</b>
A.5.1	General	73
A.5.2	Checklists for classification testing	74
A.5.3	Water content	75
A.5.3.1	Test procedures	75
A.5.3.2	Evaluation of test results	75
A.5.4	Bulk density	76
A.5.4.1	Test procedures	76
A.5.4.2	Evaluation of test results	76
A.5.5	Particle density	77
A.5.6	Particle size analysis	77
A.5.7	Consistency limits	78
A.5.8	Density index test of granular soils	78
A.5.9	Soil dispersibility	78

## Page 6

## ENV 1997-2:1999

A.5.9.1	General	78
A.5.9.2	Test procedures for all tests	78
A.5.9.3	Pinhole test	78
A.5.9.4	Double hydrometer test	79
A.5.9.5	Crumb test	79
A.5.9.6	Sodium and dissolved salts in saturation extract	79
A.5.10	Frost susceptibility	80
A.5.10.1	Test procedures	80
A.5.10.2	Evaluation of test results	80
<b>A.6</b>	<b>CHEMICAL TESTING OF SOILS AND GROUNDWATER</b>	<b>81</b>
A.6.1	General	81
A.6.1.1	Test procedures	81
A.6.1.2	Number of tests	81
A.6.2	Organic content	81
A.6.2.1	Test procedures	81
A.6.2.2	Evaluation of test results	82
A.6.3	Carbonate content	82
A.6.3.1	Test Procedures	82
A.6.3.2	Evaluation of test results	82
A.6.4	Sulphate content	83
A.6.4.1	Test Procedures	83
A.6.4.2	Evaluation of test results	83
A.6.5	pH value (acidity and alkalinity)	83
A.6.5.1	Test Procedures	83
A.6.5.2	Evaluation of test results	83
A.6.6	Chloride content	84
A.6.6.1	Test Procedures	84
A.6.6.1	Evaluation of test results	84
<b>A.7</b>	<b>COMPRESSIBILITY TESTING OF SOILS</b>	<b>84</b>
A.7.1	Test procedures	84
A.7.2	Number of tests	85
A.7.3	Evaluation of compressibility characteristics	85
<b>A.8</b>	<b>STRENGTH INDEX TESTING OF SOILS</b>	<b>86</b>
<b>A.9</b>	<b>STRENGTH TESTING OF SOILS</b>	<b>87</b>
A.9.1	Consolidated triaxial compression test	87
A.9.1.1	Test procedures	87
A.9.1.2	Number of tests	87
A.9.1.3	Evaluation of test results	88
A.9.2	Consolidated box and ring direct shear tests	88
A.9.2.1	Test procedures	88
A.9.2.2	Planning of the test programme	88
A.9.2.3	Number of tests	89
<b>A.10</b>	<b>COMPACTION TESTING OF SOILS</b>	<b>89</b>
A.10.1	Test procedures applicable to both test types	89
A.10.2	Requirements specific to compaction tests	89
A.10.3	Requirements specific to California Bearing Ratio (CBR) test	90
<b>A.11</b>	<b>PERMEABILITY TESTING OF SOILS</b>	<b>90</b>
A.11.1	Test procedures	90
A.11.2	Number of tests	91
A.11.3	Evaluation of test results	91
<b>A.12</b>	<b>PREPARATION OF SPECIMEN FOR TESTING ON ROCK MATERIAL</b>	<b>92</b>
<b>A.13</b>	<b>CLASSIFICATION TESTING OF ROCK MATERIAL</b>	<b>92</b>
A.13.1	General	92



A.13.2	Rock identification and description	93
A.13.3	Water content	93
A.13.3.1	Test procedures	93
A.13.3.2	Number of tests	93
A.13.4	Density and porosity	93
A.13.4.1	Test procedures	93
A.13.4.2	Number of tests	93
<b>A.14</b>	<b>SWELLING TESTING OF ROCK MATERIAL</b>	<b>94</b>
A.14.1	General	94
A.14.2	Swelling pressure index under zero volume change	94
A.14.3	Swelling strain index for radially confined specimen with axial surcharge	94
A.14.4	Swelling strain developed in unconfined rock specimen	94
<b>A.15</b>	<b>STRENGTH TESTING OF ROCK MATERIAL</b>	<b>95</b>
A.15.1	General	95
A.15.2	Uniaxial Compressive Strength and Deformability	95
A.15.2.1	Test procedures	95
A.15.2.2	Number of tests	97
A.15.3	Point load test	97
A.15.3.1	Test procedures	97
A.15.3.2	Number of tests	97
A.15.4	Direct shear test	98
A.15.4.1	Test procedures	98
A.15.4.2	Number of tests	98
A.15.5	Brazil test	99
A.15.5.1	Test procedures	99
A.15.5.2	Number of tests	99
A.15.6	Triaxial compression test	99
A.15.6.1	Test procedures	99
A.15.6.2	Number of tests	99
<b>BIBLIOGRAPHY</b>		<b>100</b>

## **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.

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