



SLOVENSKI STANDARD SIST EN 1997-2:2007

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Eurocode 7 - Geotechnical design - Part 2: Ground investigation and testing

Eurocode 7 - Entwurf, Berechnung und Bemessung in der Geotechnik - Teil 2:
Erkundung und Untersuchung des Baugrunds

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Eurocode 7 - Calcul géotechnique - Partie 2: Reconnaissance des terrains et essais

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Ta slovenski standard je istoveten z: EN 1997-2:2007

ICS:

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93.020	Zemeljska dela. Izkopavanja. Gradnja temeljev. Dela pod zemljo	Earthworks. Excavations. Foundation construction. Underground works

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English Version

Eurocode 7 - Geotechnical design - Part 2: Ground investigation and testing

Eurocode 7 - Calcul géotechnique - Partie 2:
Reconnaissance des terrains et essais

Eurocode 7 - Entwurf, Berechnung und Bemessung in der
Geotechnik - Teil 2: Erkundung und Untersuchung des
Baugrunds

This European Standard was approved by CEN on 12 June 2006.

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 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 Management Centre has the same status as the official versions.

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

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Contents	Page
Foreword	7
Section 1 General	10
1.1 Scope	10
1.1.1 Scope of Eurocode 7	10
1.1.2 Scope of EN 1997-2.....	10
1.2 Normative references.....	11
1.3 Assumptions	12
1.4 Distinction between Principles and Application Rules	12
1.5 Definitions	13
1.5.1 Terms common to all Eurocodes	13
1.5.2 Terms common to Eurocode 7.....	13
1.5.3 Specific definitions used in EN 1997-2	13
1.6 Test results and derived values	14
1.7 The link between EN 1997-1 and EN 1997-2	15
Section 2 Planning of ground investigations	20
2.1 Objectives	20
2.1.1 General.....	20
2.1.2 Ground	21
2.1.3 Construction materials	22
2.1.4 Groundwater	22
2.2 Sequence of ground investigations	22
2.3 Preliminary investigations	23
2.4 Design investigations.....	24
2.4.1 Field investigations	24
2.4.2 Laboratory tests	27
2.5 Controlling and monitoring	31
Section 3 Soil and rock sampling and groundwater measurements	33
3.1 General.....	33
3.2 Sampling by drilling	33
3.3 Sampling by excavation.....	33
3.4 Soil sampling	33
3.4.1 Categories of sampling methods and laboratory quality classes of samples	33
3.4.2 Soil identification.....	34
3.4.3 Planning of soil sampling.....	34
3.4.4 Handling, transport and storing of samples	35
3.5 Rock sampling	35
3.5.1 Categories of sampling methods	35
3.5.2 Rock identification.....	36
3.5.3 Planning of rock sampling	36
3.5.4 Handling, transport and storing of samples	37
3.6 Groundwater measurements in soils and rocks	37
3.6.1 General.....	37
3.6.2 Planning and execution of the measurements	37
3.6.3 Evaluation of results of groundwater measurements	38

Section 4 Field tests in soil and rock	40
4.1 General.....	40
4.2 General requirements.....	40
4.2.1 Planning a specific test programme	40
4.2.2 Execution	41
4.2.3 Evaluation	41
4.3 Cone penetration and piezocone penetration tests (CPT, CPTU).....	42
4.3.1 Objectives	42
4.3.2 Specific requirements.....	42
4.3.3 Evaluation of test results	43
4.3.4 Use of test results and derived values	43
4.4 Pressuremeter tests (PMT).....	45
4.4.1 Objectives	45
4.4.2 Specific requirements.....	45
4.4.3 Evaluation of test results	46
4.4.4 Use of test results and derived values	47
4.5 Flexible dilatometer test (FDT)	48
4.5.1 Objectives	48
4.5.2 Specific requirements.....	48
4.5.3 Evaluation of test results	48
4.5.4 Use of test results and derived values	49
4.6 Standard penetration test (SPT).....	49
4.6.1 Objectives	49
4.6.2 Specific requirements.....	49
4.6.3 Evaluation of test results	49
4.6.4 Use of test results and derived values	50
4.7 Dynamic probing tests (DP)	51
4.7.1 Objectives	51
4.7.2 Specific requirements.....	52
4.7.3 Evaluation of test results	52
4.7.4 Use of test results and derived values	52
4.8 Weight sounding test (WST)	53
4.8.1 Objectives	53
4.8.2 Specific requirements.....	53
4.8.3 Evaluation of test results	54
4.8.4 Use of test results and derived values	54
4.9 Field vane test (FVT).....	55
4.9.1 Objectives	55
4.9.2 Specific requirements.....	55
4.9.3 Evaluation of test results	55
4.9.4 Use of test results and derived values	55
4.10 Flat dilatometer test (DMT).....	56
4.10.1 Objectives	56
4.10.2 Specific requirements.....	56
4.10.3 Evaluation of test results	56
4.10.4 Use of test results and derived values	57
4.11 Plate loading test (PLT)	57
4.11.1 Objectives	57
4.11.2 Specific requirements.....	58
4.11.3 Evaluation of test results	58
4.11.4 Use of test results and derived values	58

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(standards.iteh.ai)

SIST EN 1997-2:2007
<https://standards.iteh.ai/catalog/standards/sist/ec70131b-2e57-447d-b4dc-38cf74b406/sist-en-1997-2-2007>

Section 5 Laboratory tests on soil and rock	60
5.1 General.....	60
5.2 General requirements for laboratory tests	60
5.2.1.General requirements	60
5.2.2 Procedures, equipment and presentation.....	60
5.2.3 Evaluation of test results	60
5.3 Preparation of soil specimens for testing.....	61
5.3.1 Objective	61
5.3.2 Requirements	61
5.4 Preparation of rock specimens for testing	62
5.4.1 Objective	62
5.4.2 Requirements	62
5.5 Tests for classification, identification and description of soil	63
5.5.1 General.....	63
5.5.2 Requirements for all classification tests	63
5.5.3 Water content determination.....	63
5.5.4 Bulk density determination	64
5.5.5 Particle density determination.....	64
5.5.6 Particle size analysis	64
5.5.7 Consistency limits determination.....	65
5.5.8 Determination of the density index of granular soil	66
5.5.9 Soil dispersibility determination	67
5.5.10 Frost susceptibility	68
5.6 Chemical testing of soil and groundwater.....	68
5.6.1 Requirements for all chemical tests	68
5.6.2 Organic content determination.....	70
5.6.3 Carbonate content determination.....	71
5.6.4 Sulfate content determination.....	71
5.6.5 pH value determination (acidity and alkalinity)	72
5.6.6 Chloride content determination.....	72
5.7 Strength index testing of soil	73
5.7.1 Objective	73
5.7.2 Requirements	73
5.7.3 Use of test results	73
5.8 Strength testing of soil.....	73
5.8.1 Objective and scope	73
5.8.2 General requirements	74
5.8.3 Evaluation and use of test results.....	75
5.8.4 Unconfined compression test.....	75
5.8.5 Unconsolidated, undrained triaxial compression test	76
5.8.6 Consolidated triaxial compression test	76
5.8.7 Consolidated direct shear box tests.....	77
5.9 Compressibility and deformation testing of soil.....	78
5.9.1 General.....	78
5.9.2 Oedometer compressibility testing	78
5.9.3 Triaxial deformability testing	80
5.10 Compaction testing of soil.....	81
5.10.1 Scope.....	81
5.10.2 Compaction tests.....	81
5.10.3 California Bearing ratio (CBR) test	81

5.11 Permeability testing of soil	82
5.11.1 Objective	82
5.11.2 Requirements	82
5.11.3 Evaluation and use of test results	83
5.12 Tests for classification of rocks	84
5.12.1 General	84
5.12.2 Requirements for all classification tests	84
5.12.3 Rock identification and description	84
5.12.4 Water content determination	85
5.12.5 Density and porosity determination	86
5.13 Swelling testing of rock material	86
5.13.1 General	86
5.13.2 General requirements	87
5.13.3 Evaluation of test results	87
5.13.4 Swelling pressure index under zero volume change	87
5.13.5 Swelling strain index for radially-confined specimens with axial surcharge	88
5.13.6 Swelling strain developed in unconfined rock specimen	89
5.14 Strength testing of rock material	89
5.14.1 General	89
5.14.2 Requirements for all strength tests	89
5.14.3 Evaluation of test results	90
5.14.4 Uniaxial compression and deformability test	90
5.14.5 Point load test	91
5.14.6 Direct shear test	92
5.14.7 Brazil test	93
5.14.8 Triaxial compression test	94
Section 6 Ground investigation report	95
6.1 General requirements	95
6.2 Presentation of geotechnical information	95
6.3 Evaluation of geotechnical information	96
6.4 Establishment of derived values	97
Annex A (informative) List of test results of geotechnical test standards	98
Annex B (informative) Planning of geotechnical investigations	101
Annex C (informative) Example of groundwater pressure derivations based on a model and long term measurements	109
Annex D (informative) Cone and piezocone penetration tests	111
Annex E (informative) Pressure meter test	121
Annex F (informative) Standard penetration test	125
Annex G (informative) Dynamic probing test	129
Annex H (informative) Weight sounding test	134
Annex I (informative) Field vane test	133
Annex J (informative) Flat dilatometer test Example of correlations between E_{OED} and DMT results	138
Annex K (informative) Plate loading test	139
Annex L (informative) Detailed information on preparation of soil specimens for testing	143
Annex M (informative) Detailed information on tests for classification, identification and description of soil	150
Annex N (informative) Detailed information on chemical testing of soil	157

Annex O	(informative) Detailed information on strength index testing of soil	162
Annex P	(informative) Detailed information on strength testing of soil	163
Annex Q	(informative) Detailed information on compressibility testing of soil	165
Annex R	(informative) Detailed information on compaction testing of soil	166
Annex S	(informative) Detailed information on permeability testing of soil	168
Annex T	(informative) Preparation of specimen for testing on rockmaterial	170
Annex U	(informative) Classification testing of rock material	171
Annex V	(informative) Swelling testing of rock material	173
Annex W	(informative) Strength testing of rock material	175
Annex X	(informative) Bibliography	180

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Foreword

This document (EN 1997-2: 2007) has been prepared by Technical Committee CEN/TC 250 "Structural Eurocodes", the secretariat of which is held by BSI.

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 2007, and conflicting national standards shall be withdrawn at the latest by March 2010.

This document supersedes ENV 1997-2:1999 and ENV 1997-3:1999.

CEN/TC 250 is responsible for all Structural Eurocodes.

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, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Portugal, Poland, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland and the United Kingdom.

Background of the Eurocode programme

In 1975, the Commission of the European Community decided on an action programme in the field of construction, based on article 95 of the Treaty. The objective of the programme was the elimination of technical obstacles to trade and the harmonization of technical specifications.

Within this action programme, the Commission took the initiative to establish a set of harmonised technical rules for the design of construction works, which, in a first stage, would serve as an alternative to the national rules in force in the Member States and, ultimately, would replace them.

For fifteen years, the Commission, with the help of a Steering Committee with representatives of Member States, conducted the development of the Eurocodes programme, which led to the first generation of European codes in the 1980s.

In 1989, the Commission and the Member States of the EU and EFTA decided, on the basis of an agreement¹ between the Commission and CEN, to transfer the preparation and the publication of the Eurocodes to CEN through a series of Mandates, in order to provide them with a future status of European Standard (EN). This links *de facto* the Eurocodes with the provisions of all the Council's Directives and/or Commission's Decisions dealing with European standards (e.g. the Council Directive 89/106/EEC on construction products - CPD - and Council Directives 93/37/EEC, 92/50/EEC and 89/440/EEC on public works and services and equivalent EFTA Directives initiated in pursuit of setting up the internal market).

The Structural Eurocode programme comprises the following standards generally consisting of a number of Parts:

EN 1990	Eurocode :	Basis of Structural Design
EN 1991	Eurocode 1:	Actions on structures

¹ Agreement between the Commission of the European Communities and the European Committee for Standardization (CEN) concerning the work on EUROCODES for the design of building and civil engineering works (BC/CEN/03/89).

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

Eurocode standards recognise the responsibility of regulatory authorities in each Member State and have safeguarded their right to determine values related to regulatory safety matters at national level where these continue to vary from State to State.

Status and field of application of Eurocodes

The Member States of the EU and EFTA recognise that Eurocodes serve as reference documents for the following purposes:

- as a means to prove compliance of building and civil engineering works with the essential requirements of Council Directive 89/106/EEC, particularly Essential Requirement N°1 – Mechanical resistance and stability – and Essential Requirement N°2 – Safety in case of fire;
- as a basis for specifying contracts for construction works and related engineering services;
- as a framework for drawing up harmonised technical specifications for construction products (ENs and ETAs).

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The Eurocodes, as far as they concern the construction works themselves, have a direct relationship with the Interpretative Documents² referred to in Article 12 of the CPD, although they are of a different nature from harmonised product standards³. Therefore, technical aspects arising from the Eurocodes work need to be adequately considered by CEN Technical Committees and/or EOTA Working Groups working on product standards with a view to achieving full compatibility of these technical specifications with the Eurocodes.

The Eurocode standards provide common structural design rules for everyday use for the design of whole structures and component products of both a traditional and an innovative nature. Unusual forms of construction or design conditions are not specifically covered and additional expert consideration will be required by the designer in such cases.

² According to Art. 3.3 of the CPD, the essential requirements (ERs) shall be given concrete form in interpretative documents for the creation of the necessary links between the essential requirements and the mandates for harmonised ENs and ETAGs/ETAs.

³ According to Art. 12 of the CPD the interpretative documents shall :

- a) give concrete form to the essential requirements by harmonising the terminology and the technical bases and indicating classes or levels for each requirement where necessary ;
- b) indicate methods of correlating these classes or levels of requirement with the technical specifications, e.g. methods of calculation and of proof, technical rules for project design, etc. ;
- c) serve as a reference for the establishment of harmonised standards and guidelines for European technical approvals.

The Eurocodes, *de facto*, play a similar role in the field of the ER 1 and a part of ER 2.

National Standards implementing Eurocodes

The National Standards implementing Eurocodes will comprise the full text of the Eurocode (including any annexes), as published by CEN, which may be preceded by a National title page and National foreword, and may be followed by a National annex.

The National annex may only contain information on those parameters, which are left open in the Eurocode for national choice, known as Nationally Determined Parameters, to be used for the design of buildings and civil engineering works to be constructed in the country concerned, i.e.:

- values and/or classes where alternatives are given in the Eurocode;
- values to be used where a symbol only is given in the Eurocode;
- country specific data (geographical, climatic), *e.g.* snow map;
- the procedure to be used where alternative procedures are given in the Eurocode.

It may also contain:

- decisions on the application of informative annexes;
- references to non-contradictory complementary information to assist the user to apply the Eurocode.

Links between Eurocodes and harmonised technical specifications (ENs and ETAs) for products

There is a need for consistency between the harmonised technical specifications for construction products and the technical rules for works⁴. Furthermore, all the information accompanying the CE Marking of the construction products, which refer to Eurocodes, should clearly mention which Nationally Determined Parameters have been taken into account.

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Additional information specific to Eurocode 7

EN 1997-2 gives guidance for the planning and interpretation of geotechnical laboratory and field tests that are used for the support of geotechnical design of buildings and civil engineering works.

EN 1997-2 is intended for clients, designers, geotechnical laboratories, field testing laboratories and public authorities.

EN 1997-2 is intended to be used with EN 1997-1.

When using EN 1997-2, particular regard should be paid to the underlying assumptions and conditions given in 1.3.

The six sections of EN 1997-2 are complemented by 24 informative annexes.

National annex for EN 1997-2

The national standard implementing EN 1997-2 should have a national annex containing all information concerning the application of EN 1997-2 in the relevant country.

⁴ See Art.3.3 and Art.12 of the CPD, as well as 4.2, 4.3.1, 4.3.2 and 5.2 of ID 1.

Section 1 General

1.1 Scope

1.1.1 Scope of Eurocode 7

- (1) EN 1997 is intended to be used in conjunction with EN 1990:2002, which establishes the principles and requirements for safety and serviceability, describes the basis of design and verification and gives guidelines for related aspects of structural reliability.
- (2) EN 1997 is intended to be applied to the geotechnical aspects of the design of buildings and civil engineering works. It is subdivided into various separate parts (see 1.1.2).
- (3) EN 1997 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.
- (4) Numerical values of actions on buildings and civil engineering works to be taken into account in design are provided in EN 1991 for the various types of construction. Actions imposed by the ground, such as earth pressures, shall be calculated according to the rules of EN 1997.
- (5) Separate European Standards are intended to be used to treat matters of execution and workmanship. They are denoted in the relevant sections.
- (6) In EN 1997 execution is covered to the extent that is necessary to conform to the assumptions of the design rules.
- (7) EN 1997 does not cover the special requirements of seismic design. EN 1998 provides additional rules for geotechnical seismic design, which complete or adapt the rules of this standard.

1.1.2 Scope of EN 1997-2

- (1) EN 1997-2 is intended to be used in conjunction with EN 1997-1 and provides rules supplementary to EN 1997-1 related to:
- planning and reporting of ground investigations;
 - general requirements for a number of commonly used laboratory and field tests;
 - interpretation and evaluation of test results;
 - derivation of values of geotechnical parameters and coefficients.

In addition, examples of the application of field test results to design are given.

NOTE Establishment of characteristic values is covered in EN 1997-1.

- (2) This document gives no specific provisions for environmental ground investigations.
- (3) Only commonly used geotechnical laboratory and field tests are covered in this standard. 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. The laboratory tests on soils are mainly applicable to saturated soils.

NOTE It is expected that updates of the present standard will gradually include laboratory and field tests covering additional aspects of soil and rock behaviour.

(4) The provisions of this standard apply primarily to projects of geotechnical category 2, as defined in 2.1 of EN 1997-1:2004. The ground investigation requirements for category 1 projects are normally limited as the verifications often will be based on local experience. For geotechnical category 3 projects, the amount of investigations required will normally be at least the same as indicated for geotechnical category 2 projects in the following sections. Additional investigations and more advanced tests, related to the circumstances that place a project in geotechnical category 3, may be necessary.

(5) The derivation of parameter values is dedicated primarily to the design of pile and spread foundations based on field testing, as detailed in Annexes D, E, F and G of EN 1997-1:2004.

1.2 Normative references

(1) The following normative documents contain provisions which, through reference in this text, constitute provisions of this European Standard. For dated references, subsequent amendments to, or revisions of, any of these publications do not apply. However, parties to agreements based on this European Standard are encouraged to investigate the possibility of applying the most recent editions of the normative documents indicated below. For undated references, the last edition of the normative document referred to applies.

EN 1990:2002	<i>Eurocode — Basis of structural design</i>
EN 1997-1:2004	<i>Eurocode 7 — Geotechnical design — Part 1: General rules</i>
EN ISO 14688-1	<i>Geotechnical investigation and testing — Identification and classification of soil — Part 1: Identification and description</i>
EN ISO 14688-2	<i>Geotechnical investigation and testing — Identification and classification of soil — Part 2: Classification principles</i>
EN ISO 14689-1	<i>Geotechnical investigation and testing — Identification and classification of rock - Part 1: Identification and description</i>
EN ISO 22475-1 ⁵	<i>Geotechnical investigation and testing — Sampling by drilling and excavation and groundwater measurements — Part 1: Technical principles of execution</i>
EN ISO 22476-1 ⁵	<i>Geotechnical investigation and testing — Field testing — Part 1: Electrical CPT and CPTU</i>
EN ISO 22476-2	<i>Geotechnical investigation and testing — Field testing — Part 2: Dynamic probing</i>
EN ISO 22476-3	<i>Geotechnical investigation and testing — Field testing — Part 3: Standard penetration test</i>
EN ISO 22476-4 ⁵	<i>Geotechnical investigation and testing — Field testing — Part 4: Ménard pressuremeter test</i>
EN ISO 22476-5 ⁵	<i>Geotechnical investigation and testing — Field testing — Part 5: Flexible dilatometer test</i>
EN ISO 22476-6 ⁶	<i>Geotechnical investigation and testing — Field testing — Part 6: Self boring pressuremeter test</i>

⁵ to be published

EN ISO 22476-8 ⁶	<i>Geotechnical investigation and testing — Field testing — Part 8: Full displacement pressuremeter test</i>
EN ISO 22476-9 ⁶	<i>Geotechnical investigation and testing — Field testing — Part 9: Field vane test</i>
EN ISO 22476-12 ⁶	<i>Geotechnical investigation and testing — Field testing — Part 12: Mechanical CPT</i>
EN ISO 22476-13 ⁶	<i>Geotechnical investigation and testing — Field testing — Part 13: Plate loading test</i>

NOTE The Bibliography presents a number of CEN ISO Technical Specifications (CEN ISO/TS), giving information on procedures, equipment, evaluation and presentation for some field and laboratory tests. These technical specifications may become European/ISO standards in due time. The National Standards Body may decide to keep its national standard in force during the lifetime of a CEN ISO/TS. National Annexes to EN 1997-2 may give information regarding national practise involved.

1.3 Assumptions

- (1) Reference is made to - EN 1990:2002, 1.3 and EN 1997-1:2004, 1.3.
- (2) The provisions of this standard are based on the assumptions given below:
 - data required for design are collected, recorded and interpreted by appropriately qualified personnel;
 - structures are designed by appropriately qualified and experienced personnel;
 - adequate continuity and communication exist between the personnel involved in data-collection, design and construction;

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1.4 Distinction between Principles and Application Rules

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- (1) Depending on the character of the individual clauses, distinction is made in EN 1997-2 between Principles and Application Rules.
- (2) The Principles comprise:
 - general statements and definitions for which there is no alternative;
 - requirements and analytical models for which no alternative is permitted unless specifically stated.
- (3) The Principles are preceded by the letter P.
- (4) The Application Rules are examples of generally recognised rules which follow the Principles and satisfy their requirements.
- (5) It is permissible to use alternatives to the Application Rules given in this standard, provided it is shown that the alternative rules accord with the relevant Principles and are at least equivalent with regard to the structural safety, serviceability and durability, which would be expected when using the Eurocodes.

NOTE If an alternative design rule is submitted for an application rule, the resulting design cannot be claimed to be wholly in accordance with EN 1997-2, although the design will remain in accordance with the Principles of EN 1997-1. When EN 1997-2 is used in respect of a property listed in an Annex Z of a product standard or an ETAG, the use of an alternative design rule may not be acceptable for CE marking.

(6) In EN 1997-2, the Application Rules are identified by a number in brackets e.g. as in this clause.

1.5 Definitions

1.5.1 Terms common to all Eurocodes

(1)P The terms used in common for all Eurocodes are defined in EN 1990.

1.5.2 Terms common to Eurocode 7

(1)P The terms specific to EN 1997 are defined in 1.5.2 of EN 1997-1:2004.

1.5.3 Specific definitions used in EN 1997-2

1.5.3.1

derived value

value of a geotechnical parameters obtained from test results by theory, correlation or empiricism (see 1.6)

1.5.3.2

disturbed sample

sample where the soil structure, water content and/or constituents have been changed during sampling

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1.5.3.3

measured value

value that is measured in a test

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1.5.3.4

natural specimen

specimen made from the available (disturbed, undisturbed, remoulded) sample

1.5.3.5

quality class

classification by which the quality of a soil sample is assessed in the laboratory

NOTE For laboratory testing purposes, soil samples are classified in five quality classes (see 3.4.1).

1.5.3.6

remoulded sample

sample of which the soil or rock structure is fully disturbed

1.5.3.7

remoulded specimen

fully disturbed specimen, at natural water content