

DIN EN 1997-2:2007-10 (E)

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

| 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 |

| | |
|--|-----------|
| 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 |