DIN EN 1997-2:2010-10 (E)

Eurocode 7: Geotechnical design - Part 2: Ground investigation and testing (includes Corrigendum AC:2010)

Contents

Page

Foreword 7

Section 1 General 10

1.1 Scope 10
1.1.1 Scope of Eurocode 7 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
1.6 Test results and derived values 14

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

1.8 Symbols and units 16

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
4.3.1 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 ... 56
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
4.3 Cone penetration and piezocone penetration tests (CPT, ~CPTM,TM CPTU) ... 42

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 ..... 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 8
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

0 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 8
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 132 Annex I (informative) Field vane test 133

Annex J (informative) Flat dilatometer test Example of correlations between EOED 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