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| Section 5 Laboratory tests5.1 General | Section 5 Laboratory tests5.1 General |
| (1)P The laboratory test program shall be established in conjunction with the other parts of the ground investigation program (see Section 2 for more details). | (1)P The laboratory test program shall be established in conjunction with the other parts of the ground investigation program (see Section 2 for more details). |
| (2) Whenever possible, the information obtained from field tests and soundings should be used for selecting the test samples (see 2.4.1.3). | (2) Whenever possible, the information obtained from borings, field tests and soundings should be used for selecting the test samples (see 2.4.1.3). |
| 5.2 General requirements for laboratory tests |  |
| ~~(1) The requirements given in this section should be considered a minimum.~~  ~~(2) Additional specifications, additional presentation requirements or additional interpretation, as appropriate for the ground conditions or geotechnical aspects of interest, may be required.~~  ~~(3)P Details of the tests required to determine the parameters needed for design shall be specified.~~ |  |
| ~~5.2.2 Procedures, equipment and presentation~~ |  |
| (1)P Tests shall be carried out and reported according to existing EN and EN ISO documents.  ~~NOTE CEN ISO/TS documents are available for a number of laboratory tests. Some EN ISO documents are under preparation~~.. | (3)P Tests shall be carried out and reported according to existing EN and EN ISO documents. |
| (~~2) Provided the requirements of this standard are met, alternative test methods and procedures may be selected.~~ | (4) (P) If there are no existing EN and EN ISO documents, test methods and their evaluation shall be precisely described.  Note: The same idea shall be added to Section 2 Planning |
| ~~(3)P Checks shall be made that the laboratory equipment used is adequate, fit for its purpose, calibrated and within the calibration requirements.~~  ~~(4) The reliability of the equipment and procedures should be checked by comparing the test results with data obtained on comparable soil or rock types~~. | . |
| ~~(5)P The test methods and procedures used shall be reported together with the test results. Any deviations from a standard test procedure shall be reported and justified.~~ |  |
| ~~(6) If appropriate, the results of laboratory soil classification tests should be presented together with the soil profile on a plot summarizing the soil description and all classification results.~~  ~~(7) If possible and required, the location of the other laboratory tests (such as oedometer and triaxial tests) should be indicated on the same plot.~~ |  |
| 5.2.3 Evaluation of test results |  |
| ~~(1) Requirements for evaluation of laboratory test results are given in 6.3.~~ |  |
| ~~(2) Results of individual tests should be compared with other test results to check that no contradiction exists between the available data.~~  ~~(3) The test results should be checked with values found in the literature, correlations with index properties and comparable experience.~~ |  |
|  | (5) Test samples shall be described in accordance with EN-ISO 14688, for soil samples, and EN-ISO 14689, for rock samples.  (From 5.4.2.(8)) |
|  | (6)P The requirements of EN-ISO 22475-1:2006 (Section 11), relevant to handling and processing of samples, shall be observed.  *From 5.3.2.2.1* |
| 5.3 Preparation of soil specimens for testing | 5.2 Preparation of specimens for testing |
| (1) The objective of the preparation of soil for laboratory tests is to provide test specimens that are as representative as possible of the soil from which the samples are taken. | (1) The preparation of ground ~~soil~~ for laboratory tests shall provide test specimens that are as representative as possible of the ground ~~soil~~ from which the samples are taken. |
| ~~5.3.1 Objective~~ | (2)P Specimens shall be tested promptly after their preparation. |
|  | (3)P Samples shall be protected at all times against damage, deterioration, change in water content and excessive changes in temperature.  *From 5.3.2.2.3 and 5.4.2 (4)*  (4)P Special care shall be taken with undisturbed samples to prevent distortion and loss of water or moisture during the preparation of test specimens.  *From 5.3.2.2.3*  Note: check if in the new Section 3 there are guidelines to select the samples |
|  | 5.2.1 Soil specimen |
| (2) For the purposes of preparation, five types of soil specimens may be distinguished: disturbed, undisturbed, re-compacted, remoulded and reconstituted specimens. | (1) For the purposes of preparation, five types of soil specimens may be distinguished: disturbed, undisturbed, re-compacted, remoulded and reconstituted specimens. |
| ~~5.3.2 Requirements~~~~5.3.2.1 Quantity of soil~~ |  |
| (1)P The soil specimen used for testing shall be sufficiently large to take account of:   * the largest size of particles present in significant quantity; * the natural features such as structure and fabric (e.g. discontinuities).   NOTE Minimum masses of disturbed soil for classification tests and tests on re-compacted specimens and masses of soil required for preparation of undisturbed specimens for strength and compressibility tests are given in Annex L. | (2)P The soil specimen used for testing shall be sufficiently large to take account of:   * the largest size of particles present in significant quantity; * the natural features such as structure and fabric (e.g. discontinuities).   NOTE Minimum masses of disturbed soil for classification tests and tests on re-compacted specimens and masses of soil required for preparation of undisturbed specimens for strength and compressibility tests are given in Annex L. |
| 5.3.2.2 Handling and processing |  |
| ~~(1)P The requirements of EN-ISO 22475-1 shall be observed~~  (T*o 5.1.6)* |  |
| ~~(2)P All samples shall be clearly and unambiguously labelled.~~ |  |
| ~~(3)P Soil samples shall be protected at all times against damage, deterioration and excessive changes in temperature. Special care shall be taken with undisturbed samples to prevent distortion and loss of water during the preparation of test specimens. The material used for the sampling containers shall not react with the contained soil.~~  (*To 5.1.7)* |  |
| ~~(4)P Soil shall not be allowed to dry before testing if the test results can be affected by a loss of moisture.~~  ~~(5) Undisturbed samples should be prepared under conditions of controlled humidity. If preparation is interrupted, the specimen should be protected from changes in water content.~~ |  |
| 6)P If disaggregating processes are applied, the breaking down of individual particles shall be avoided. If special treatment of bonded and cemented soil is required, this shall be specified.  (7)P Subdivision methods shall ensure that representative portions are obtained, avoiding segregation of large particles | (6)P If disaggregating processes are applied, the breaking down of individual particles shall be avoided. If special treatment of bonded and cemented soil is required, this shall be specified.  (7)P Subdivision methods shall ensure that representative portions are obtained, avoiding segregation of large particles. |
| 5.4 Preparation of rock specimens for testing5.4.1 Objective | 5.2.2 Rock specimens |
| ~~(1) The objective of preparing specimens for testing rock is to provide specimens that are as representative as possible of a rock formation.~~  NOTE Annexes T to W and X.2 provide more detail on the preparation of rock specimens for testing and some guidelines.  To 5.2.2 (1) |  |
| 5.4.2 Requirements (1)P It shall be specified how a rock specimen is prepared. ~~If these specifications cannot be met, the specimen shall be prepared as near to the specifications as possible and it shall be reported how the specimen has been prepared~~. | (1)P It shall be specified how a rock specimen is to be prepared.  NOTE Annexes T to W and X.4.8 provide more detail on the preparation of rock specimens for testing and some guidelines. |
| ~~(2)P All instruments and assemblies for determining straightness, flatness and perpendicularity of end surfaces shall be controlled on a registered regular time basis with tolerances satisfying at least the requirements of the specific rock tests.~~ |  |
| (3)P The following shall be specified:   * the storage conditions for rock samples (short term and/or long term storage); * the moisture condition of the test specimens at the time of the test; * the method for preparing rock core specimens; * the method for determining dimension and shape tolerances. | (2)P The following shall be specified:   * the storage conditions for rock samples (short term and/or long term storage); * the moisture condition of the test specimens at the time of the test; * the method for preparing rock core specimens; The need for re-coring to a specified dimension shall be defined with reference to the laboratory coring method, coolant applied and the need for re-saturation of the test specimens * the method for determining dimension and shape tolerances. |
| ~~(4) Any change in water content should be avoided. If a change in the natural water content should occur, its effect shall be counteracted as part of the preparation for testing, if relevant.~~  ~~(5) If any change in the natural water content should occur, the cause and effect of it any change in water content should be reported.~~  (6)P The need for re-coring to a specified dimension shall be defined with reference to the laboratory coring method, coolant applied and the need for re-saturation of the test specimens.  To 5.2.2 (2) |  |
|  | 5.3 Evaluation of tests |
| (7) Together with the data and results for the particular test, the following should be recorded and reported:   * the source of test specimen, including depth/level and orientation in space; * the dates of specimen preparation and testing; * comments on the representativeness of the specimen(s) tested; * all dimension and shape measurements, including conformity to requirements; * the water content of the sample/specimen (as received, during preparation, saturated);   the conditions for drying (air- or oven-drying, pressurised or partial vacuum). | (1) Together with the data and results for the particular test, the following information should be recorded and reported:   * the source of test specimen, including depth/level and orientation in space; * the dates of specimen preparation and testing; * comments on the representativeness of the specimen(s) tested; * all dimension and shape measurements, including conformity to requirements; * the water content of the sample/specimen (as received, during preparation, saturated); * the conditions for drying (air- or oven-drying, pressurised or partial vacuum). |
| (8) The following information on the samples should be given for the interpretation of the test results:   * a physical description of the specimen including rock type (such as sandstone, limestone, granite, etc.), location and orientation of inherent rock structural features and any discontinuities, and inclusions or non-homogeneities; * a sketch of the test specimen or a colour photograph for other than monotonous homogeneous rock types; * a Core Recovery and Rock Quality Designation, where possible; * data to substantiate the tolerance checks on deviations of the right cylindrical form of the test specimen, from the flatness of the end bearing surfaces and perpendicularity of the end surfaces with respect to the axis of the core. | (2) The following information on the samples should be given for the interpretation of the test results:   * a physical description of the specimen including soil or rock type (such as sandstone, limestone, granite, etc.), location and orientation of inherent structural features and any discontinuities, and inclusions or non-homogeneities; * a colour photograph or a sketch of the test specimen * for rock specimens, a Core Recovery and Rock Quality Designation, where possible; * for rock specimens, data to substantiate the tolerance checks on deviations of the right cylindrical form of the test specimen, from the flatness of the end bearing surfaces and perpendicularity of the end surfaces with respect to the axis of the core. |