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# Methods of test for soils for civil engineering purposes – Part 1: General requirements and sample preparation

bsi.

## Publishing and copyright information



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This document comprises a front cover, an inside front cover, pages i to ii, pages 1 to 48, an inside back cover and a back cover.

# Foreword

## Publishing information

This British Standard is published by BSI Standards Limited, under licence from The British Standards Institution, and came into effect on 31 July 2016. It was prepared by Subcommittee B/526/3, *Site investigation and ground testing*, under the authority of Technical Committee B/526, *Geotechnics*. A list of organizations represented on these committees can be obtained on request to their secretary.

## Supersession

This British Standard supersedes BS 1377-1:1990, which is withdrawn.

## Information about this document

This new edition of BS 1377-1 incorporates technical changes only. It does not represent a full review or revision of the standard, which will be undertaken in due course.

Text introduced or altered by Corrigendum No.1 is indicated in the text by tags〉 〈. Minor editorial corrections are not tagged.

## Presentational conventions

The provisions of this standard are presented in roman (i.e. upright) type. Its requirements are expressed in sentences in which the principal auxiliary verb is "shall".

*Commentary, explanation and general informative material is presented in smaller italic type, and does not constitute a normative element.*

Requirements in this standard are drafted in accordance with *Rules for the structure and drafting of UK standards*, subclause **J.1.1**, which states, "Requirements should be expressed using wording such as: 'When tested as described in Annex A, the product shall ...'". This means that only those products that are capable of passing the specified test will be deemed to conform to this standard.

## Contractual and legal considerations

This publication does not purport to include all the necessary provisions of a contract. Users are responsible for its correct application.

**Compliance with a British Standard cannot confer immunity from legal obligations.**

# 0 Introduction

This British Standard consists of nine Parts. Part 1 contains general information relevant to all the other Parts. Parts 2 to 8 describe methods of test on soils for civil engineering purposes for which samples need to be taken for testing in a laboratory. The laboratory test procedures are grouped under the following headings.

— *Part 2: Classification tests*;

— *Part 3: Chemical and electro-chemical tests*;

— *Part 4: Compaction-related tests*;

— *Part 5: Compressibility, permeability and durability tests*;

— *Part 6: Consolidation and permeability tests in hydraulic cells and with pore pressure measurement*;

— *Part 7: Shear strength tests (total stress)*;

— *Part 8: Shear strength tests (effective stress)*.

Part 9 specifies methods of test which are carried out directly on the soil in-situ.

*Part 1: General requirements and sample preparation*. Part 1 of this British Standard contains general information relating to the tests, common calibration and specification requirements and general requirements for testing laboratories and field work. It also includes details of procedures for the preparation of disturbed and undisturbed samples, where these are common to more than one type of test. The main changes introduced by this new edition are as follows.

a) Extend the maximum period between recalibration of balances from six months to one year.

b) Amend the requirements for calibration certificates of reference equipment to be in accordance with BS EN ISO 17025.

c) Include references to the BS EN ISO 17892 series of standards, where these have been published and the equivalent tests in BS 1377-2 have been superseded.

d) Amend “moisture content” to “water content” in accordance with BS EN ISO 17892-1.

e) Remove references to withdrawn British Standards, and replace with references to the current BS, EN or ISO replacements.

*Part 2: Classification tests*. Part 2 describes tests for the classification of soils according to Atterberg limits and particle size distribution. No changes in principle have been made in the test procedures. Note that the water content, density and particle density tests have been superseded by tests in the BS EN ISO 17892 series.

*Part 3: Chemical and electro-chemical tests*. Part 3 describes chemical tests on soils and on water.

Test procedures include for the determination of the following.

a) Loss on ignition.

b) Carbonate content.

c) Chloride content.

d) Total dissolved solids.

 

Tests also include for the assessment of the corrosivity of soils; these are the determination of the electrical resistivity and of the redox potential. In-situ methods of these two tests are given in Part 9.

*Part 4: Compaction-related tests*. Part 4 describes those tests that refer in some way to the compaction of soils. These include procedures for determining compaction parameters; additional tests for measurement of the limiting densities of non-cohesive soils; and tests which are related to the control and behaviour of soil placed in-situ as fill, comprising the CBR test, the moisture condition test and the chalk crushing value test. Attention is given to several methods of sample preparation appropriate to different soil types prior to compaction tests and the compaction of samples for the CBR test.

*Part 5: Compressibility, permeability and durability tests*. Part 5 describes test procedures in which the presence or drainage or flow of water within the pore spaces of the soil is the significant factor, but without requiring the measurement of pore water pressure. These include the one-dimensional oedometer consolidation test, and tests for determining the swelling and collapsing characteristics. Further additional test procedures are as follows.

a) Determination of soil permeability (constant-head method).

b) Determination of erodibility and dispersive characteristics of fine-grained soils.

c) Determination of potential frost heave for which reference is made to BS 812-124.

*Part 6: Consolidation and permeability tests in hydraulic cells and with pore pressure measurement*. Part 6 describes tests for the determination of consolidation and permeability parameters using equipment in which the measurement of pore water pressure is an essential feature. These comprise the following.

a) Determination of consolidation properties in a hydraulic consolidation cell. For samples of large diameter, either vertical or horizontal (radial) drainage can be used.

b) Determination of consolidation properties in a triaxial cell under isotropic conditions.

*Part 7: Shear strength tests (total stress)*. Part 7 describes methods for the determination of the shear strength of soils in terms of total stress, or (in the case of drained direct shear tests) in terms of effective stress when equal to total stress. These comprise the following.

a) The unconsolidated, undrained triaxial compression test, which includes a multi-stage method which is appropriate under certain conditions.

b) A test for determining unconfined compressive strength using standard laboratory apparatus.

c) The laboratory vane test for very soft soils.

d) Direct shear tests using the shear box and the ring shear apparatus, including the determination of drained and drained-residual shear strength parameters.

*Part 8: Shear strength tests (effective stress)*. Part 8 describes the determination of effective stress shear strength parameters in the consolidated-drained and consolidated-undrained triaxial compression tests.