BS 1377-3:2018+A1:2021

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Methods of test for soils for civil engineering purposes

Part 3: Chemical and electro-chemical testing

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Contents

Summary of pages
This document comprises a front cover, an inside front cover, pages I to VI, pages 1 to 98, an inside back cover and a back cover.

Foreword

Publishing information

This part of BS 1377 is published by BSI Standards Limited, under licence from The British Standards Institution, and came into effect on 31 July 2018. It was prepared by Subcommitee 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 the committee manager.

Supersession

BS 1377-3:2018+A1:2021 supersedes BS 1377-3:2018, which is withdrawn.

Relationship with other publications

BS 1377 is published in the following parts:

- Part 1: General requirements and sample preparation;
- Part 2: Classification tests;
- Part 3: Chemical and electrochemical 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: In-situ tests.

Information about this document

This part of BS 1377 is intended to be read in conjunction with BS 1377-1.

In this part of BS 1377, the tests described in the 1990 edition have been retained. Additional tests have been added to include the recommendations of BRE Special Digest 1 (BRE 2005) [1]. Also, analytical methods of chemical analysis have been included, i.e. total carbon analyzer, ion chromatography and inductively coupled plasma atomic emission spectroscopy. The two point resistivity method has been removed and additional four point tests included.

Text introduced or altered by Amendment No. 1 is indicated in the text by the tags A1 〈A1. Minor editorial changes are not tagged.

Amendment A1 introduces the following principal changes:

- technical changes to BS 1377-3 to remove an error in the wording and to improve clarity.

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It is expected that tests conducted in accordance with this British Standard will be carried out by suitably trained and experienced staff.

WARNING. It is dangerous to add water to concentrated acid.

Use of this document

It has been assumed in the preparation of this part of BS 1377 that the execution of its provisions will be entrusted to appropriately qualified and experienced people, for whose use it has been produced.

Presentational conventions

The provisions of this standard are presented in roman (i.e. upright) type. Its methods are expressed as a set of instructions, a description, or 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.

Where words have alternative spellings, the preferred spelling of the Shorter Oxford English Dictionary is used (e.g. “organization” rather than “organisation”).

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1 Scope

This part of BS 1377 describes test methods for determining the amount of chemical substances in samples of soil and extremely weak and very weak rocks, as defined by BS 5930, and groundwater.

NOTE 1 Chemical tests in this part of BS 1377 may be used on other rocks if required.

It also describes test methods for the determination of some electrochemical and resistivity properties of solid samples.

NOTE 2 These tests provide data to assess the potential of the ground and solutes to damage construction materials, including cementitious materials and metals in the ground. They can also be used in assessment of the potential for volume change of the ground due to chemical reaction. Resistivity test results can also be used to assess in-situ resistivity results.

This British Standard is not written for testing samples from contaminated land or for soil quality assessment.

Procedures described in this part of BS 1377 are for the determination of the following:

a) organic matter content in the material (Clause **4**);

b) total organic carbon (TOC) content in the material (Clause **5**);

c) loss on ignition of the material (Clause **6**);

d) sulfur compounds (Clause **7**):

   1) water-soluble sulfate content of the material by 2:1 extraction;

   2) sulfate content in groundwater;

   3) acid-soluble sulfate content of the material;

   4) total sulfur content of the material;

   5) total sulfide content (total reduced sulfur) content of the material;

   6) acid-soluble sulfide (monosulfides sulfur) content of the material;

e) carbonate content of the material (Clause **8**);

f) chloride content (Clause **9**):

   1) water-soluble chloride content of the material;

   2) acid-soluble chloride content of the material.

g) water-soluble magnesium content of the material (Clause **10**);

h) total dissolved solids of the groundwater (Clause **11**);

i) pH value (Clause **12**);

j) electrical resistivity of the material (Clause **13**); and

k) redox potential of the material (Clause **14**).

Brief guidance on the detrimental effects of sulfur compounds on engineering works and alternative methods of identifying the specific minerals is given in Annex A.

NOTE 3 Good practice in chemical testing requires duplicate specimens to be tested. In each of the test methods the measurement of only one value of the overall result is described. It is recognized that it is necessary in many practical applications to make a number of tests in order to obtain a representative value and an indication of the reliability of the results. Guidance on the number of measurements required and the treatment of the results obtained are not provided in this standard.

