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AMERICAN SOCIETY FOR TESTING AND MATERIALS
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Standard Test Method for Determining Cement Content of Fresh Soil-Cement (Heat of Neutralization Method)¹

This standard is issued under the fixed designation D 5982; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reapproval. A superscript epsilon (ε) indicates an editorial change since the last revision or reapproval.

1. Scope

1.1 This test method covers the procedure for determining the cement content of fresh soil-cement. This test method can be used for determining the cement content of specimens that contain 3 to 16 % cement. This test method is appropriate for soil-cement containing up to 55 % plus 4.75 mm (No. 4) sieve-size particles with a maximum particle size of 75 mm (3 in.). It should not be used for determining the Class F pozzolan content of these mixtures.

1.2 The values stated in SI units are to be regarded as the standard. The inch-pound units given in parentheses are for information only.

1.3 *This standard does not purport to address all of the safety concerns, if any, associated with its use. It is the responsibility of the user of this standard to establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use.* Specific precautionary statements are given in Section 8.

2. Referenced Documents

2.1 ASTM Standards:

- C 219 Terminology Relating to Hydraulic Cement²
- D 653 Terminology Relating to Soil, Rock, and Contained Fluids³
- D 2216 Test Method for Laboratory Determination of Water (Moisture) Content of Soil and Rock³
- D 4753 Specification for Evaluating, Selecting, and Specifying Balances and Scales for Use in Testing Soil, Rock, and Related Construction Materials³
- E 644 Test Methods for Testing Industrial Resistance Thermometers⁴

3. Terminology

3.1 Definitions:

- 3.1.1 Refer to Terminology D 653 for terms relating to soil.
- 3.1.2 Refer to Terminology C 219 for terms relating to hydraulic cement.

¹ This test method is under the jurisdiction of ASTM Committee D-18 on Soil and Rock and is the direct responsibility of Subcommittee D18.15 on Stabilization with Admixtures.

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² Annual Book of ASTM Standards, Vol 04.01.

³ Annual Book of ASTM Standards, Vol 04.08.

⁴ Annual Book of ASTM Standards, Vol 14.03.

3.2 Definitions of Terms Specific to This Standard:

3.2.1 *heat of neutralization*—the difference between the temperature of soil-cement/buffer solution after mixing and the average of buffer solution and soil-cement test specimen temperature before mixing.

3.2.2 *percent cement*—percentage of cement by total mass of specimen.

4. Summary of Test Method

4.1 A representative sample of fresh soil-cement is obtained. The temperature of the soil-cement test specimen and a buffer solution are determined separately and recorded. The buffer solution is added to the soil-cement test specimen and vigorously mixed. After mixing, the temperature of the soil-cement/buffer solution mixture is determined and recorded. The heat of neutralization is calculated and, from a previously established calibration curve, the cement content of the test specimen is obtained.

5. Significance and Use

5.1 This procedure provides a means for reliably determining the cement content of soil-cement in approximately 15 to 20 min. The procedure can be used to determine the cement content of soil-cement to ± 1 percentage point by mass of dry sample of the actual cement content, that is generally adequate for most construction control applications.

5.2 The buffer solution reacts with the calcium hydroxide in the cement and may react with calcareous material in the soil to produce heat. Any reaction from calcareous soil is accommodated in the calibration curve but below 3 % cement content there is usually insufficient temperature reaction for reliable results. Because Class F pozzolan may not contain any calcium hydroxide for reaction, this test method will not determine percentage Class F pozzolan in the mix.

6. Apparatus

6.1 *Balance or Scale*—Chosen in accordance with Specification D 4753.

6.1.1 A typical balance or scale used for obtaining the mass of a soil-cement test specimen must be readable to 0.01 kg or 0.01 lbm and have a capacity of about 9.1 kg (20 lbm).

6.1.2 A typical balance or scale used for preparing the buffer solution (see 7.4) must be readable to 0.1 g and have a capacity of about 3000 g.