Designation: D1632 – 17$^{\varepsilon 1}$

Standard Practice for Making and Curing Soil-Cement Compression and Flexure Test Specimens in the Laboratory[1]

This standard is issued under the fixed designation D1632; 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.

This standard has been approved for use by agencies of the U.S. Department of Defense.

ε[1] NOTE—DOD statement was added editorially in March 2020.

1. Scope*

1.1 This practice covers the procedure for making and curing compression and flexure test specimens of soil-cement in the laboratory under accurate control of quantities of materials and test conditions.

1.2 *Units*—The values stated in inch-pound units are to be regarded as standard, except as noted below. The values given in parentheses are mathematical conversions to SI units, which are provided for information only and are not considered standard. Sieve sizes are identified by the standard designation in Specification E11. The alternative sieve size designation given in parentheses is for information only and does not represent a different standard sieve size.

1.2.1 The gravitational system of inch-pound units is used when dealing with inch-pound units. In this system, the pound (lbf) represents a unit of force (weight) while the unit for mass is slugs.

1.2.2 The slug unit of mass is almost never used in commercial practice; that is, density, balances, etc. Therefore, the standard unit for mass in this standard is either kilogram (kg) or gram (g), or both. Also, the equivalent inch-pound unit (slug) is not given/presented in parantheses.

1.2.3 It is common practice in the engineering/construction profession to concurrently use pounds to represent both a unit of mass (lbm) and of force (lbf). This implicitly combines two separate systems of units; that is, the absolute system and the gravitational system. It is scientifically undesirable to combine the use of two separate sets of inch-pound units within a single standard. As stated, this standard includes the gravitational system of inch-pound units and does not use/present the slug unit for mass. However the use of balances or scales, recording pounds of mass (lbm) or recording in lbm/ft^3 shall not be regarded as nonconformance with this standard.

1.3 All observed and calculated values shall conform to the guidelines for significant digits and rounding established in Practice D6026 unless superseded by this test method.

1.3.1 The procedures used to specify how data are collected/recorded and calculated in the standard are regarded as the industry standard. In addition, they are representative of the significant digits that generally should be retained. The procedures used do not consider material variation, purpose for obtaining the data, special purpose studies, or any considerations for the user's objectives; and it is common practice to increase or reduce significant digits of reported data to be commensurate with these considerations. It is beyond the scope of these test methods to consider significant digits used in analysis methods for engineering data.

1.4 *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, health, and environmental practices and determine the applicability of regulatory limitations prior to use.*

1.5 *This international standard was developed in accordance with internationally recognized principles on standardization established in the Decision on Principles for the Development of International Standards, Guides and Recommendations issued by the World Trade Organization Technical Barriers to Trade (TBT) Committee.*

2. Referenced Documents

2.1 *ASTM Standards:*[2]

C127 Test Method for Relative Density (Specific Gravity) and Absorption of Coarse Aggregate

D558 Test Methods for Moisture-Density (Unit Weight) Relations of Soil-Cement Mixtures

[1] This practice is under the jurisdiction of ASTM Committee D18 on Soil and Rock and is the direct responsibility of Subcommittee D18.15 on Stabilization With Admixtures.

Current edition approved Nov. 1, 2017. Published November 2017. Originally approved in 1959. Last previous edition approved in 2007 as D1632 – 07, which was withdrawn in July 2016 and reinstated in November 2017. DOI: 10.1520/D1632-17E01.

[2] For referenced ASTM standards, visit the ASTM website, www.astm.org, or contact ASTM Customer Service at service@astm.org. For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.

***A Summary of Changes section appears at the end of this standard**

D559 Test Methods for Wetting and Drying Compacted Soil-Cement Mixtures
D560 Test Methods for Freezing and Thawing Compacted Soil-Cement Mixtures
D653 Terminology Relating to Soil, Rock, and Contained Fluids
D1633 Test Methods for Compressive Strength of Molded Soil-Cement Cylinders
D1634 Test Method for Compressive Strength of SoilCement Using Portions of Beams Broken in Flexure (Modified Cube Method)
D1635 Test Method for Flexural Strength of Soil-Cement Using Simple Beam with Third-Point Loading
D3740 Practice for Minimum Requirements for Agencies Engaged in Testing and/or Inspection of Soil and Rock as Used in Engineering Design and Construction
D4753 Guide for Evaluating, Selecting, and Specifying Balances and Standard Masses for Use in Soil, Rock, and Construction Materials Testing
D6026 Practice for Using Significant Digits in Geotechnical Data
E11 Specification for Woven Wire Test Sieve Cloth and Test Sieves

3. Terminology

3.1 *Definitions:*

3.1.1 For definitions of common technical terms in this standard, refer to Terminology D653.

4. Significance and Use

4.1 This practice is used to prepare soil-cement specimens for compressive and flexural strength testing in accordance with Method B of Test Methods D1633, Test Method D1634, and Test Method D1635.

4.2 This practice does not apply to soil-cement specimens prepared in commonly available molds, which are 4.0 in. (101.6 mm) in diameter and 4.584 in. (116.4 mm) in height. For these size specimens, Methods D559 or Methods D560 should be used for sample preparation. Compressive strength testing should be in accordance with Method A of Test Method D1633.

4.3 This practice offers a set of instructions for performing one or more specific operations. This document cannot replace education or experience and should be used in conjunction with professional judgment. Not all aspects of this practice may be applicable in all circumstances. This ASTM standard is not intended to represent or replace the standard of care by which the adequacy of a given professional service must be judged, nor should this document be applied without consideration of a project's many unique aspects. The word "standard" in the title of this document means only that the document has been approved through the ASTM consensus process.

NOTE 1—The quality of the result produced by this standard is dependent on the competence of the personnel performing it, and the suitability of the equipment and facilities used. Agencies that meet the criteria of Practice D3740 are generally considered capable of competent and objective testing/sampling/inspection/etc. Users of this standard are cautioned that compliance with Practice D3740 does not in itself assure reliable results. Reliable results depend on many factors; Practice D3740 provides a means of evaluating some of those factors.

5. Apparatus

5.1 *Compression Test Specimen Molds*—Molds (Fig. 1) having an inside diameter of 2.8 ± 0.01 in. (71 ± 0.25 mm) and a height of 9 in. (229 mm) for molding test specimens 2.8 in. (71 mm) in diameter and 5.6 in. (142 mm) high; machined steel top and bottom pistons having a diameter 0.005 in. (0.13 mm) less than the mold; a 6-in. (152-mm) long mold extension; and a spacer clip. At least two aluminum separating disks 0.06 in. (1.52 mm) thick with diameters 0.02 in. to 0.03 in (0.5 mm to 0.8 mm) less than the mold shall be provided.

NOTE 2—Molds may be made from cold-drawn, seamless steel tubing having a Rockwell hardness of approximately 85 HRB or from steel pipe machined on the inside.

5.2 *Flexure Test Specimen Molds*—Molds having inside dimensions of 3 by 3 by 11.25 in. (76.2 by 76.2 by 285.8 mm) (see Fig. 2 and Fig. 3) for molding specimens of the same size. The molds shall be so designed that the specimen will be molded with its longitudinal axis in a horizontal position. The parts of the molds shall be tight-fitting and positively held together. The sides of the molds shall be sufficiently rigid to prevent spreading or warping, and shall be made of metal having a hardness not less than 85 HRB. The interior faces of

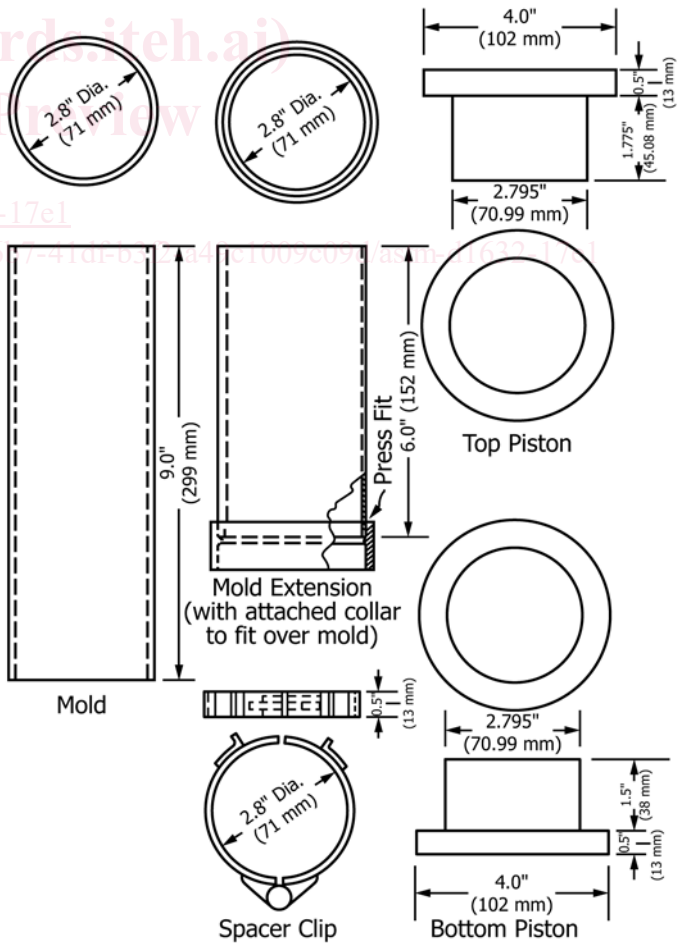

FIG. 1 Soil-Cement Cylinder Mold

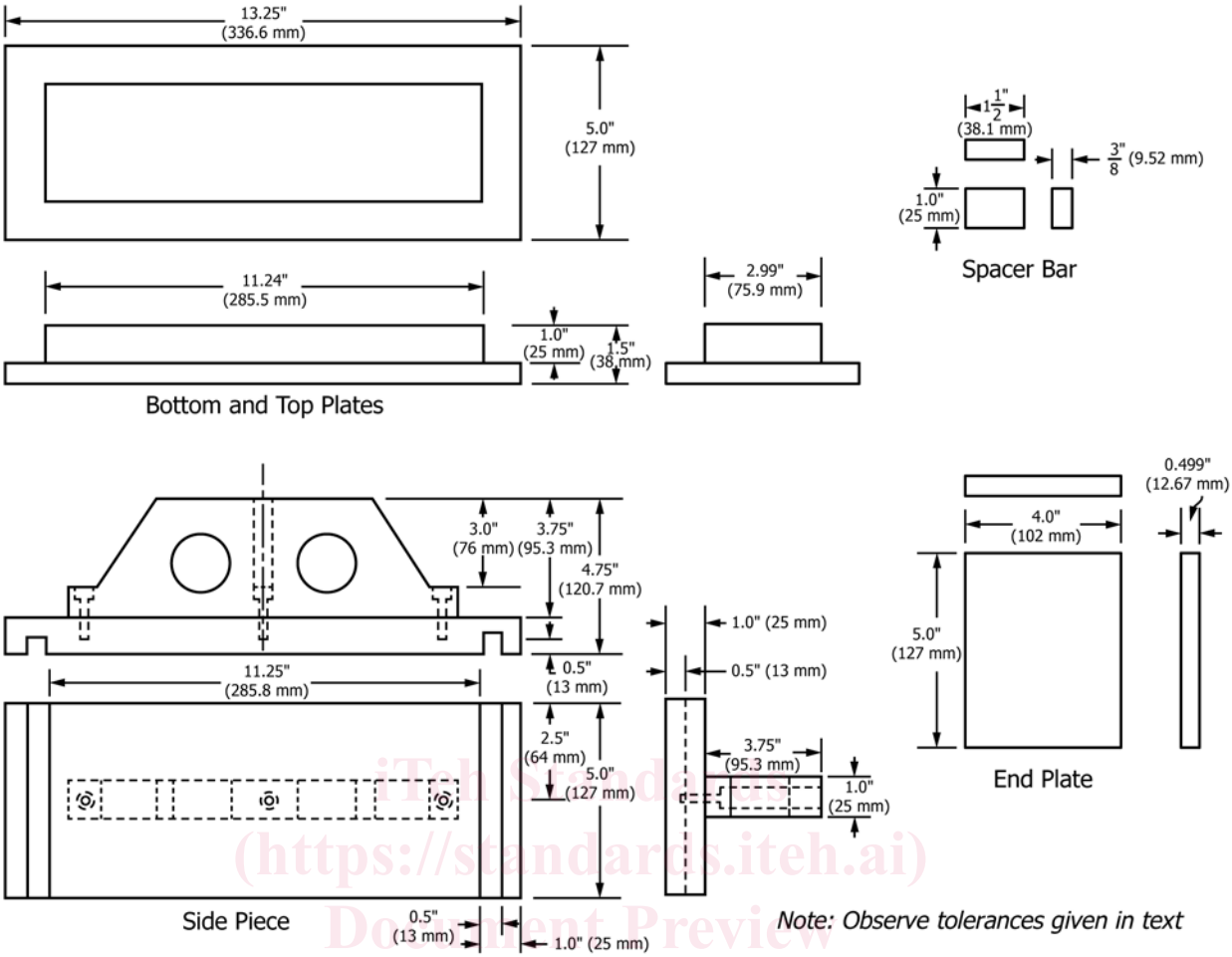

FIG. 2 Mold for Soil-Cement Beam for Flexure Test

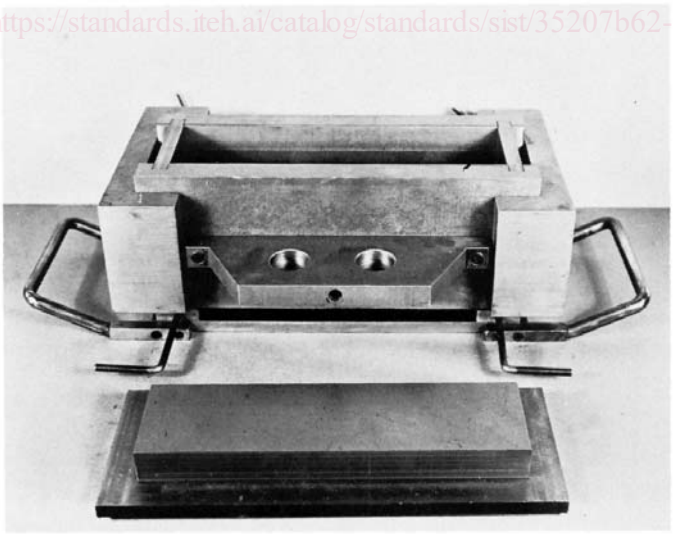

FIG. 3 Heavy Steel Mold and Top Plate for Making 3 by 3 by 11.25-in. (76.2 by 76.2 by 285.8-mm) Flexure Test Beam

the molds shall be plane surfaces with a permissible variation, in any 3-in. (76.2-mm) line on a surface, of 0.002 in. (0.051 mm) for new molds and 0.003 in. (0.076 mm) for molds in use. The distance between opposite sides shall be 3 ± 0.01 in. (76.20 ± 0.25 mm) for new molds, and 3 ± 0.015 in. (76.20 ± 0.38 mm) for molds in use. The height of the molds shall be 3 in. (76.20 mm) with permissible variations of −0.01 in. (−0.25 mm) and + 0.005 in. (+ 0.13 mm) for both new molds and for molds in use. Four 0.375-in. (9.52-mm) spacer bars and top and bottom machined steel plates shall be provided. The plates shall fit the mold with a clearance of 0.01 in. (0.03 mm) or less on all sides.

5.3 *Sieves*—50-mm (2-in.), 19.0-mm (¾-in.), 4.75-mm (No. 4) and 1.18-mm (No. 16) sieves conforming to the requirements of Specification E11.

5.4 *Balances*—A Class GP5 balance meeting the requirements of Guide D4753 for a balance of 1-g readability and a Class GP2 balance meeting the requirements of Guide D4753 for a balance of 0.1-g readability.

5.5 *Drying Oven*—A thermostatically controlled drying oven capable of maintaining a temperature of 230 ± 9°F (110 ± 5°C) for drying moisture samples.

5.6 *Compression Testing Machine or Compression Frame,* having a capacity of approximately 60 000 lbf (267 kN) for compacting flexural test specimens and for optional use in compacting compression test specimens.