

Designation: D 2168 – 90 (Reapproved 1996)^{e1}

Standard Test Methods for Calibration of Laboratory Mechanical-Rammer Soil Compactors¹

This standard is issued under the fixed designation D 2168; 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.

^{e1} NOTE—This standard was incorrectly typeset in the 1997 volume and has been editorially corrected in March 1997.

1. Scope

1.1 These test methods for the calibration of mechanical soil compactors are for use in checking and adjusting mechanical devices used in laboratory compacting of soil and soil-aggregate in accordance with Test Methods D 698, D 1557, and other methods of a similar nature which might specify these test methods. Calibration for use with one method does not qualify the equipment for use with another method.

1.2. The weight of the mechanical rammer is adjusted as described in 5.4 and 6.5 in order to provide that the mechanical compactor will produce the same result as the manual compactor.

1.3 Two alternative procedures are provided as follows:

		Section
Test Method A	Calibration based on the compaction of a selected soil sample	5
Test Method B	Calibration based on the deformation of a standard lead cylinder	6

1.4 If a mechanical compactor is calibrated in accordance with the requirements of either Test Method A or Test Method B, it is not necessary for it to meet the requirements of the other method.

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

1.6 *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.*

2. Referenced Documents

2.1 ASTM Standards:

D 653 Terminology Relating to Soil, Rock, and Contained Fluids²

D 698 Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort (12 400 ft-lbf/ft³ (600 kN-m/m³))²

D 1557 Test Method for Laboratory Compaction Characteristics of Soil Using Modified Effort (56 000 ft-lbf/ft³ (2700 kN-m/m³))²

D 2487 Classification of Soils for Engineering Purposes (Unified Soil Classification System)²

E 11 Specification for Wire-Cloth Sieves for Testing Purposes³

E 145 Specification for Gravity-Convection and Forced-Ventilation Ovens³

3. Significance and Use

3.1 Mechanical compactors are commonly used to replace the hand compactors required for Test Methods D 698 and D 1557 in cases where it is necessary to increase production.

3.2 The design of mechanical compactors is such that it is necessary to have a calibration process that goes beyond determining the mass and drop of the hammer.

4. Apparatus

4.1 For Test Method A, in addition to the apparatus requirements specified in Test Methods D 698 and D 1557, the following is required:

4.1.1 *Drying Oven*—Thermostatically controlled oven, preferably of the forced-draft type, meeting the requirements of Specification E 145 and capable of maintaining a uniform temperature of 140 ± 5°F (60 ± 12°C) throughout the drying chamber.

4.2 For Test Method B, in addition to the apparatus requirements specified in Test Methods D 698 and D 1557, the following are required:

4.2.1 *Lead Deformation Apparatus*—A lead deformation apparatus consisting of an anvil, guide collar, and striking pin, as shown in Fig. 1.

4.2.2 *Micrometer*—A 1-in. or 25-mm outside micrometer caliper reading to 0.001 in. or 0.02 mm, for determining the length of the lead cylinders. As an alternative, a dial comparator of equal accuracy may be used to determine either the length of the lead cylinder, or the entire length of the complete lead deformation apparatus assembly. In order to measure the complete assembly, a dial comparator with a minimum opening of 2 in. (51 mm) and a travel of 1 in. (25 mm) is required (see Fig. 2).

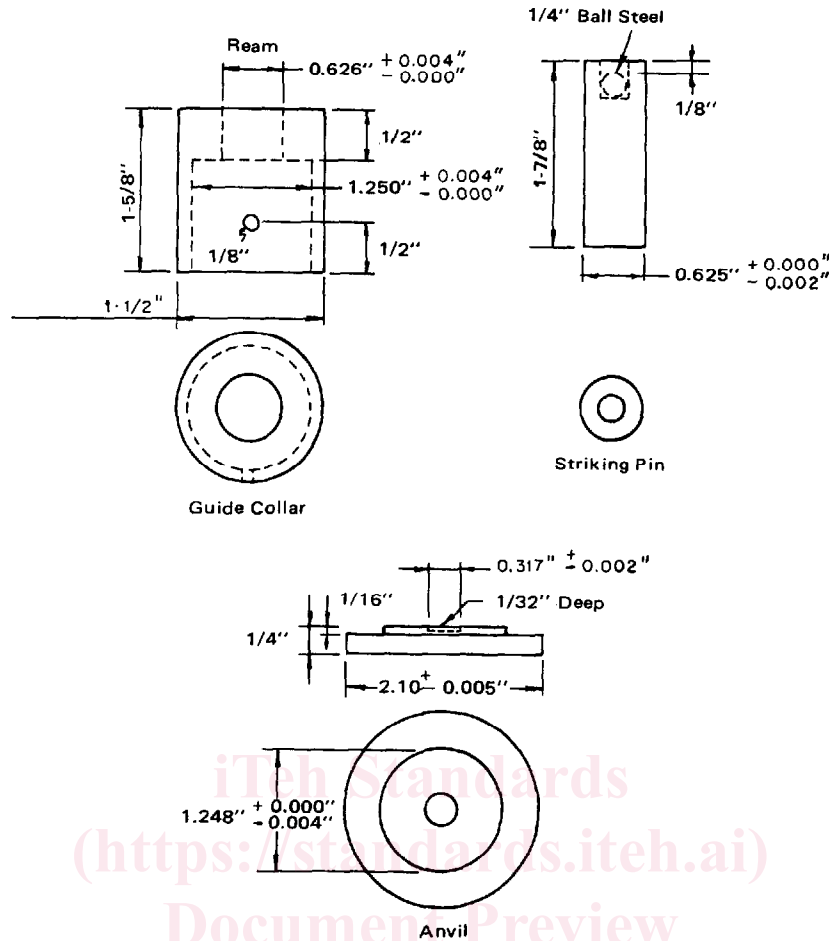
¹ These test methods are under the jurisdiction of ASTM Committee D-18 on Soil and Rock and are the direct responsibility of Subcommittee D 18.03 on Texture, Plasticity, and Density Characteristics of Soils.

Current edition approved June 29, 1990. Published October 1990. Originally published as D 2168 – 80. Last previous edition D 2168 – 90.

² *Annual Book of ASTM Standards*, Vol 04.08.

³ *Annual Book of ASTM Standards*, Vol 14.02.

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in.	mm
2.10	53.34
1 7/8	48
1 1/2	38
1.250	31.75
1.248	31.70
0.626	15.90
0.625	15.88
1/2	13
0.317	8.05
1/4	6.4
1/8	3.2
1/16	1.6
1/32	0.79
0.005	0.13
0.004	0.10
0.002	0.05
0.001	0.02

NOTE—Inside dimension of guide collar should slip easily over raised section of anvil without excessive free play. Anvil should slip easily inside guide sleeve pedestal without excessive free play.

FIG. 1 Lead Deformation Apparatus

NOTE 1—The use of vernier calipers is not recommended since they can produce erroneous readings if not zeroed correctly or if the vernier caliper is not of high quality.

4.2.3 *Guide Sleeve Pedestal*—A guide sleeve pedestal for use with guide sleeves used to control the drop of the manual rammers in Test Methods D 698 and D 1557 (see Fig. 3).

4.2.4 *Test Cylinders*—A supply of commercially pure lead test cylinders having individual masses such that the lightest cylinder is within 0.06 g of the heaviest, each having

a length of 0.675 ± 0.005 in. (17.1 ± 0.1 mm) and a diameter of 0.310 ± 0.002 in. (7.87 ± 0.05 mm).⁴ A minimum of ten test cylinders is required for the calibration of one mechanical compactor. However, depending on circumstances, as many as 100 test cylinders may be required.

⁴ Lead test cylinders are available from the Hornady Manufacturing Co., P.O. Box 1848, Grand Island, Nebr. 68801 in lots of 500.