Designation: D 2844 – 94

Standard Test Method for Resistance *R*-Value and Expansion Pressure of Compacted Soils[1]

This standard is issued under the fixed designation D 2844; 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 testing both treated and untreated laboratory compacted soils or aggregates with the stabilometer and expansion pressure devices to obtain results indicative of performance when placed in the base, subbase, or subgrade of a road subjected to traffic.

1.2 The values stated in inch-pound units are to be regarded as the standard.

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.*

2. Referenced Documents

2.1 *ASTM Standards:*

C 670 Practice for Preparing Precision and Bias Statements for Test Methods for Construction Materials[2]

E 4 Practices for Force Verification of Testing Machines[3]

E 11 Specification for Wire-Cloth Sieves for Testing Purposes[4]

2.2 *AASHTO Documents:*

T 190 Test Method for Resistance R-Value and Expansion Pressure of Compacted Soils[5]

3. Significance and Use

3.1 This test method is used to measure the potential strength of subgrade, subbase, and base course materials for use in road and airfield pavements. The R-value is used by some agencies as a criteria for acceptance of aggregates for base course and bituminous courses.

3.2 The expansion pressure testing has been used in conjunction with the R-value test to determine cover requirements (thickness) and construction controls to reduce pavement distortion from expansive subgrade soils.

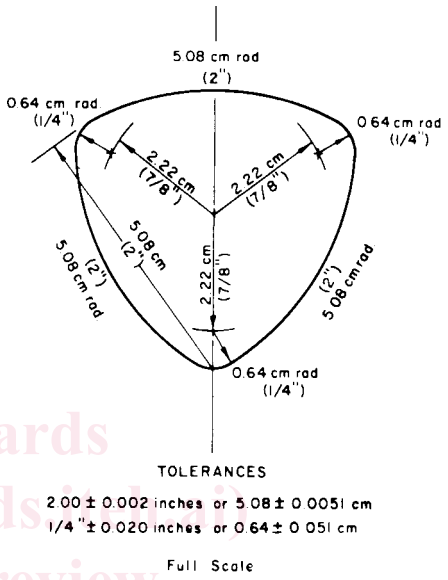

FIG. 1 Tamper Shoe for Kneading Compactor

4. Apparatus

4.1 *Kneading Compactor*, capable of applying an average contact pressure of 350 ± 16 psi (2410± 110 kPa) to the tamper foot shown in Fig. 1 and with provisions for maintaining this pressure during changes in sample height. The load-time trace shall be free of "chatter" or evidence of impact-associated changes in slope. The rise time for application of foot pressure, in the range from 35 to 300 psi (240 to 2070 kPa), shall not be less than 0.07 nor more than 0.20: The dwell time, measured at 300 psi foot pressure, shall not be less than 0.15 nor more than 0.45 s: The pressure-release or removal time shall not be greater than 0.60 s.

4.1.1 The compactor shall include a counter or timer for measuring the number of tamps applied to a specimen and a mold holder, for use in compacting specimens, that rotates equally between tamps to give 5 to 7 tamps per revolution of the mold. The holder shall firmly restrain the mold during compaction. The base of the mold holder shall have a metal plate $3^{31}/_{32}$ in. (100.8 mm) in diameter and 0.5 in. (12.7 mm) high to which is cemented a rubber disk having a diameter of $3^{15}/_{16}$ in. (100.0 mm) and a height of ⅛ in. (3.2 mm). The plate shall be an integral part of the base of the mold holder. The compactor shall also include a trough for feeding the sample

[1] This test method is under the jurisdiction of ASTM Committee D-18 on Soil and Rock and is the direct responsibility of Subcommittee D18.08 on Special and Construction Control Tests.

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[2] Annual Book of ASTM Standards, Vol 04.02.

[3] Annual Book of ASTM Standards, Vol 03.01.

[4] Annual Book of ASTM Standards, Vol 14.02.

[5] Available from American Association of State Highway and Transportation Officials, 444 N. Capitol St., NW, Suite 225, Washington, DC 20001.

into the mold in 20 increments (Fig. 2). Troughs with a semicircular cross section of 6 in.[3] (39 cm^2) in area and 20 in. (50.8 cm) long have proven satisfactory.

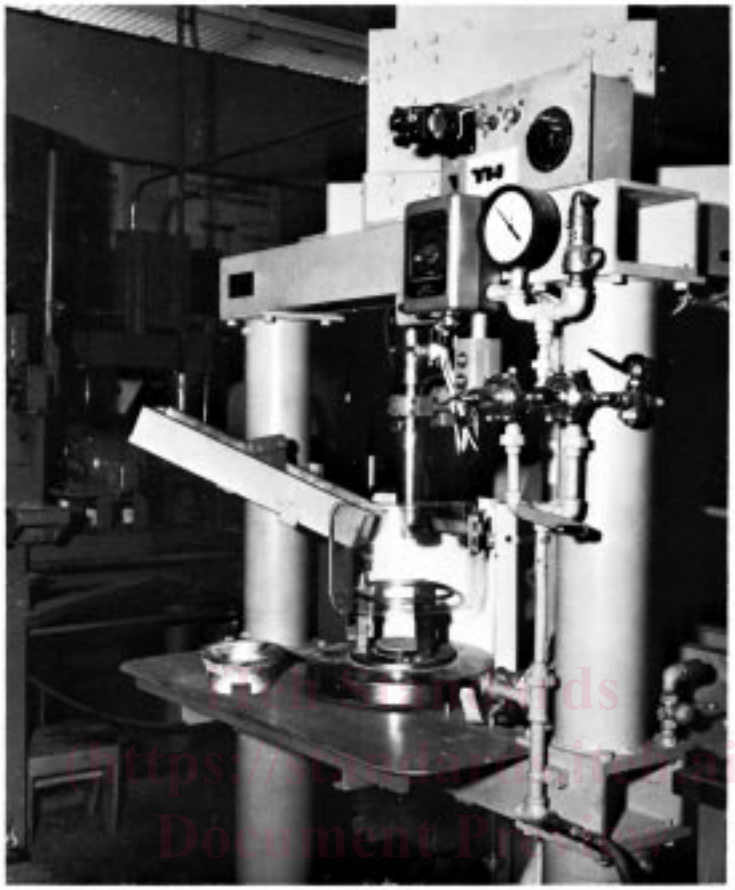

FIG. 2 Compactor with Sample Feed Trough

4.2 *Compression Testing Machine*, with a minimum capacity of 10 000 lbf (45 kN) and satisfying the requirements of Practices E 4.

4.3 *Mold*, 4 ± 0.002 in. (101.6 ± 0.05 mm) inside diameter by 5 ± 0.008 in. (127 ± 0.20 mm) high. (See Fig. 3 for surface roughness.)

4.4 *Rubber Disks*, 3 15/16 in. (100 mm) in diameter by ⅛ in. (3 mm) thick and having a durometer hardness of 60 ± 15.

4.5 *Metal Follower*, solid-walled, metal specimen follower 3.95 ± 0.005 in. (100.33 ± 0.13 mm) in outside diameter by 5 in. (127 mm) long.

4.6 *Exudation Device*, as shown in Fig. 4.[6]

4.7 *Phosphor Bronze Disk*, as shown in Fig. 5.

4.8 *Filter Paper*, 100 mm in diameter and 0.006 in. (1.5 mm) thick, smooth surface, medium filtering speed, medium retention.

4.9 *Filter Paper*, 110 mm in diameter and 0.006 in. (1.5 mm) thick, creped surface, medium-fast filtering speed, medium retention.

4.10 *Expansion-Pressure Device*, with accessories as shown in Fig. 6. [6] There should be at least three of these devices for each sample to be tested within a day's time.

4.11 *Deflection Gage*, with divisions of 0.0001 in. (0.002 mm) and an allen wrench as shown in Fig. 6.

4.12 *Stabilometer*, with accessories, as shown in Fig. 7 and Fig. 8.[6]

4.13 *Standard Metal Specimen*, 4 in. (101.60 mm) in outside diameter by 6 in. (152.2 mm) high as shown in Fig. 8.

4.14 *Balance*, 5000-g capacity, accurate to 1 g.

4.15 *Sieves*, 1 in. (25.0 mm), ¾ in. (19.0 mm) and No. 4 (4.75 mm) conforming to the requirements of Specification E 11.

4.16 *Miscellaneous Equipment*, including mixing pans, spoons, spatulas, and gallon cans with close-fitting lids.

5. Soil Preparation

5.1 Remove any coatings from coarse aggregate and break clay lumps to pass the No. 4 (4.75-mm) sieve.

5.2 Adjust the soil graduation when some of the material is retained on the ¾-in. (19.0-mm) sieve. When 75 % or more passes the ¾-in. sieve, use that part of the sample passing the¾-in. sieve. If less than 75 % of the sample passes the 1-in.

[6] Copies of detailed drawings of the apparatus shown in Figs. 4 (1 drawing), 6 (4 drawings), 7 and 8 (7 drawings) are available at a nominal cost from the ASTM Headquarters. Request Adjunct No. ADJD284401, ADJD284402, and ADJD284403, respectively.