Designation: C1245/C1245M – 06

Standard Test Method for Determining Bond Strength Between Hardened Roller Compacted Concrete and Other Hardened Cementitious Mixtures (Point Load Test)[1]

This standard is issued under the fixed designation C1245/C1245M; 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 is intended for testing roller-compacted concrete specimens and covers determination of the relative bond between layers of roller-compacted concrete or other hardened concrete in multiple-lift forms of construction. It is applicable to all types of layered concrete where the total depth is sufficient to meet the minimum specimen length and diameter requirements of this test method. This test method is not intended to provide tensile strength results of the material tested.

1.2 The values stated in SI units, shown in brackets, or inch-pound units are to be regarded separately as standard. The values stated in each system may not be exact equivalents; therefore, each system shall be used independently of the other, without combining values in any way. Combining values from the two systems may result in non-conformance with 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:*[2]

C39/C39M Test Method for Compressive Strength of Cylindrical Concrete Specimens

C42/C42M Test Method for Obtaining and Testing Drilled Cores and Sawed Beams of Concrete

C125 Terminology Relating to Concrete and Concrete Aggregates

C192/C192M Practice for Making and Curing Concrete Test Specimens in the Laboratory

C670 Practice for Preparing Precision and Bias Statements for Test Methods for Construction Materials

C1176 Practice for Making Roller-Compacted Concrete in Cylinder Molds Using a Vibrating Table

C1435/C1435M Practice for Molding Roller-Compacted Concrete in Cylinder Molds Using a Vibrating Hammer

D1557 Test Methods for Laboratory Compaction Characteristics of Soil Using Modified Effort (56,000 ft-lbf/ft^3(2,700 kN-m/m^3))

3. Terminology

3.1 Refer to Terminology C125 for definitions of terms used in this test method.

4. Significance and Use

4.1 This test method is used to measure the effectiveness of bonding roller-compacted concrete to other roller-compacted concrete or other hardened cementitious mixtures by using a point load test at the joint. Bond strength is determined using drilled cores or cast cylindrical specimens in which the bond surface is essentially normal to the longitudinal axis at approximately the mid-length of the specimen. A splitting tensile stress normal to the bond surface is produced by applying a point load at the joint.

4.2 This test method may be used either for laboratory investigation by casting individual composite cylinders or by coring prototype structures or assemblies (Test Method C42/C42M).

5. Apparatus

5.1 *Testing Machine*—The testing machine shall conform to the requirements of Test Method C39/C39M.

5.2 *Testing Apparatus*—The testing apparatus shall be constructed of steel and allow the testing of both 4 and 6-in. [100 and 150-mm] diameter specimens. The test schematic is given

[1] This test method is under the jurisdiction of ASTM Committee C09 on Concrete and Concrete Aggregates and is the direct responsibility of Subcommittee C09.45 on Roller-Compacted Concrete.

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[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.**

in Fig. 1. The testing apparatus shall permit the positioning of a specimen such that the joint of the bonded surfaces is oriented as closely as possible parallel to the direction of loading. Figs. 2-9 provide the information necessary to construct the apparatus for 4 and 6-in. [100 and 150-mm] diameter specimens. Anvil rods (Fig. 3 and Fig. 5) shall have a hardness of not less than 55 HRC (Rockwell hardness number of 55 on the C scale) and shall be plane on the bearing surfaces to within ±0.001 in. [0.025 mm]. The alignment post shall ensure that the anvil rods are kept parallel to each other in the vertical plane. The system is easily adaptable to most testing machines.

6. Test Specimens

6.1 Test specimens shall be cores or cast cylinders 4 or 6 ± 0.25 in. [100 or 150 ± 5 mm] in diameter. Cast cylinders in accordance with Practice C1176, Practice C1435/C1435M, or Test Method D1557. Cut each core and cast each cylinder to ensure that the plane best describing the bond surface is oriented at 90 ± 15° to the long axes of the specimens.

6.2 Cure molded test specimens in accordance with Practice C192/C192M (laboratory specimens). Drilled cores shall be moisture conditioned in accordance with Test Method C42/C42M.

NOTE 1—Test results are not affected significantly by specimen surfaces obtained with normal coring operations. The ends of cores need not be trimmed.

NOTE 2—Where the bond surface undulates grossly, that is, the surface has a local texture exceeding 0.5 in. [13 mm] in amplitude, 6-in. [150-mm] diameter cores are preferable. No information is available on the relative results of 6-in. [150-mm] versus 4-in. [100-mm] diameter specimens.

7. Procedure

7.1 *Measurements*—Determine the diameter of the test specimens by averaging three diameters measured on the bond surface. Visually identify the bond surface by color, texture, or material contrasts. Measure diameters to the nearest 0.01 in. [0.25 mm] with calipers, whenever possible, but at least to the nearest 0.1 in. [2.5 mm]. Determine the length of each section

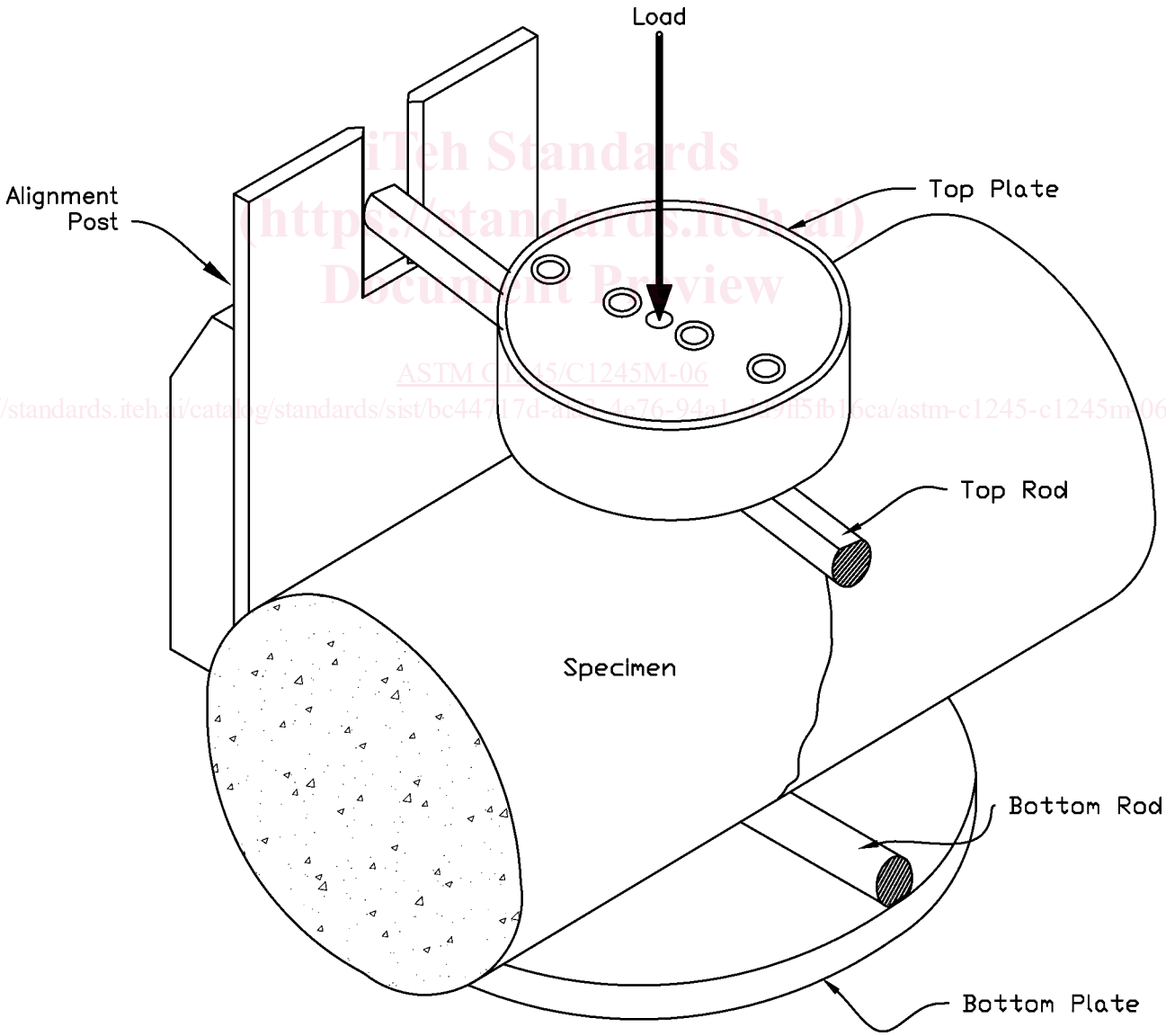


FIG. 1 Schematic of Loading Method

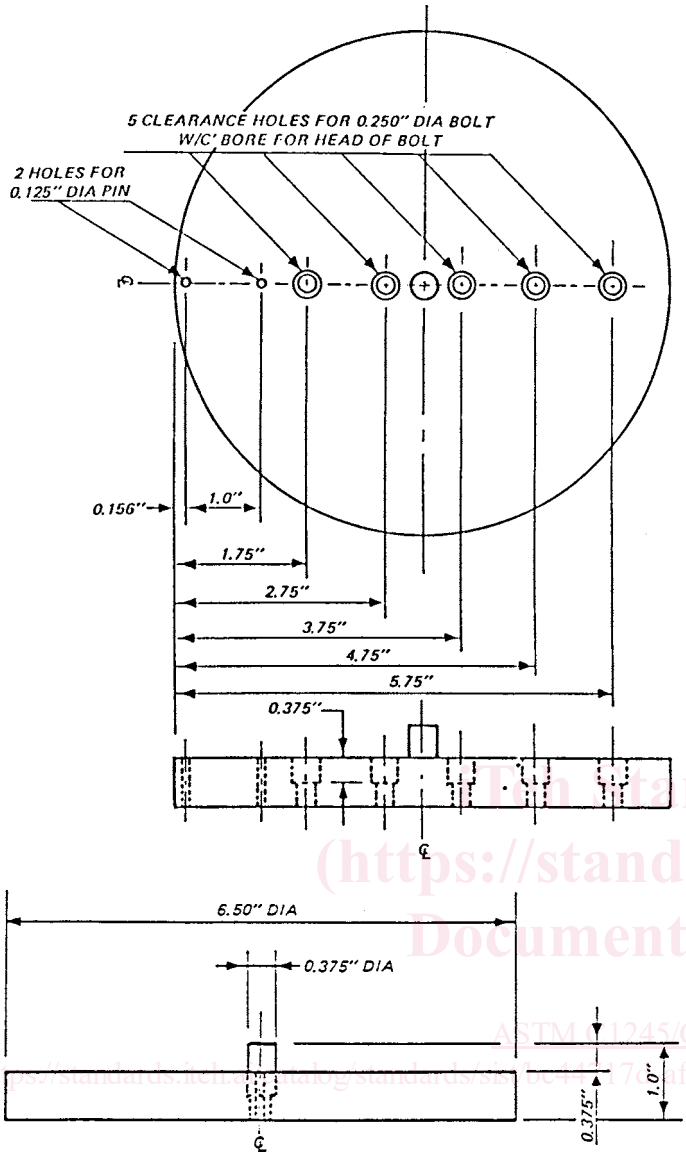
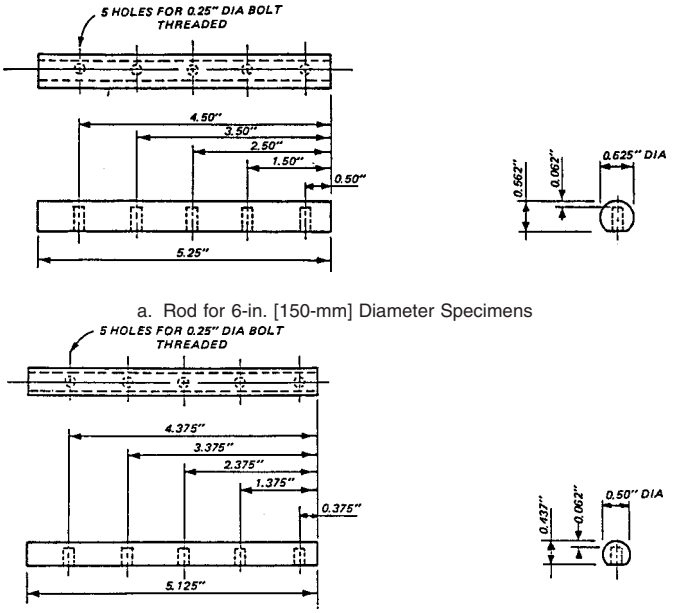


FIG. 2 Base Plate



a. Rod for 6-in. [150-mm] Diameter Specimens

b. Rod for 4-in. [100-mm] Diameter Specimens

FIG. 3 Bottom Anvil Rods

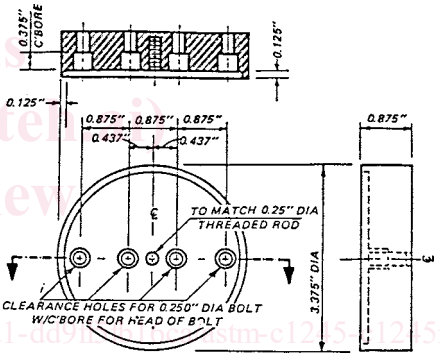


FIG. 4 Top Plate

of the bonded specimens to the nearest 0.1 in. [2.5 mm], and use these lengths to determine the section length-to-diameter ratios. Specimens must have a minimum length-to-diameter ratio of 1.2 if the bond plane is at mid-length (within ±0.25 in. [6 mm]) of the specimen. If the bond plane is not at mid-length of the specimen, the section on each side of the bond plane shall be of a length at least 0.6 the diameter. Where the bond surface is irregular or undulating, mark on the specimen a line representing a plane extending through and along the approximate average bearing of the bond surface, and measure the length from this line.

NOTE 3—Many drilled cores will not be smooth enough to justify the measurement of diameters closer than to the nearest 0.1 in. [2.5 mm].

7.2 *Positioning*—Assemble and position the apparatus in the testing machine. Place the specimen on the bottom plate with the joint in contact with the anvil rods (see Fig. 1). The longer anvil rods (Fig. 3a and Fig. 5a) and the longer alignment post (Fig. 9) are used to test 6-in. [150-mm] diameter specimens. The shorter anvil rods (Fig. 3b and Fig. 5b) and the shorter alignment post (Fig. 8) are used to test 4-in. [100-mm] diameter specimens.

7.2.1 Zero the load-indicating mechanism. Position the specimen so that the bond surface is parallel to the upper and lower anvil rods (see Fig. 1). This is best accomplished by positioning the specimen by hand while gently bringing the top anvil into contact with the specimen. Alternatively, the specimen may be supported with modeling clay or pieces of polystyrene. Where the bond surface is irregular or undulating, align the anvil rods along the approximate average bearing of the bond surface. Bring the anvil rods in contact with the bond surface at the contact point on the circumference of the specimen.