



Designation: C 1176 – 92 (Reapproved 1998)

## Standard Practice for Making Roller-Compacted Concrete in Cylinder Molds Using a Vibrating Table<sup>1</sup>

This standard is issued under the fixed designation C 1176; 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 ( $\epsilon$ ) indicates an editorial change since the last revision or reapproval.

### 1. Scope

1.1 This practice covers procedures for making cylindrical test specimens from concrete when the standard procedures of rodding and internal vibration, as described in Practice C 31, are not practicable. This practice is applicable to freshly mixed concrete, prepared in the laboratory and the field, having a nominal maximum size aggregate of 50 mm (2 in.) or less. If the nominal maximum size aggregate is larger than 2 in., the practice is applicable only when performed on the fraction passing the 50-mm (2-in.) sieve with the larger aggregate being removed in accordance with Practice C 172. This practice, intended for use in testing roller-compacted concrete, may be applicable to testing other types of concrete such as cement-treated aggregate and mixtures similar to soil-cement.

1.2 Two methods are provided for making concrete cylinders using a vibrating table:

1.2.1 Method A is a procedure for making test specimens in steel reusable molds attached to a vibrating table.

1.2.2 Method B is a procedure for making test specimens in single-use plastic molds that have been inserted into a metal sleeve attached to a vibrating table.

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

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

### 2. Referenced Documents

#### 2.1 ASTM Standards:

C 31 Practice for Making and Curing Concrete Test Specimens in the Field<sup>2</sup>

C 39 Test Method for Compressive Strength of Cylindrical

Concrete Specimens<sup>2</sup>

C 172 Practice for Sampling Freshly Mixed Concrete<sup>2</sup>

C 192 Practice for Making and Curing Concrete Test Specimens in the Laboratory<sup>2</sup>

C 470 Specification for Molds for Forming Concrete Test Cylinders Vertically<sup>2</sup>

C 496 Test Method for Splitting Tensile Strength of Cylindrical Concrete Specimens<sup>2</sup>

C 1170 Test Methods for Consistency and Density of Roller-Compacted Concrete Using a Vibrating Table<sup>2</sup>

E 11 Specification for Wire-Cloth Sieves for Testing Purposes<sup>3</sup>

#### 2.2 ACI Reports and Standards:

207.5R-88 Report on Roller-Compacted Concrete<sup>4</sup>

211.3-75 (R 1988) Practice for Selecting Proportions for No-Slump Concrete<sup>4</sup>

#### 2.3 Bureau of Reclamation Test Procedure:

USBR 4906-86 Casting No-Slump Concrete in Cylinder Molds Using Vibratory Table<sup>5</sup>

### 3. Summary of Practice

3.1 This practice describes methods for making cylindrical concrete test specimens using a vibrating table. Test specimens are made in cylindrical molds that are attached to the vibrating table under a 20-lb (9.1-kg) surcharge to facilitate consolidation.

### 4. Significance and Use

4.1 This practice is intended to be used for stiff to extremely dry concrete mixtures commonly used in roller-compacted concrete construction. This practice is used instead of rodding or internal vibration, which cannot properly consolidate concrete of this consistency (Note 1).

NOTE 1—Further description of this concrete consistency is given in ACI 207.5R-88 and 211.3-75 (R 1988). The consistency of concrete may

<sup>1</sup> This practice is under the jurisdiction of ASTM Committee C-9 on Concrete and Concrete Aggregates and is the direct responsibility of Subcommittee C09.45 on Roller-Compacted Concrete.

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<sup>2</sup> *Annual Book of ASTM Standards*, Vol 04.02.

<sup>3</sup> *Annual Book of ASTM Standards*, 14.02.

<sup>4</sup> *ACI Manual of Concrete Practice, Part 1, Materials and General Properties of Concrete*, 1988, American Concrete Institute, P.O. Box 19150, Detroit, MI 48219.

<sup>5</sup> "Guidelines for Designing and Constructing Roller-Compacted Concrete Dams," *ACER Technical Memorandum No. 8*, Bureau of Reclamation, Denver, CO, Appendix A, 1987.

be determined in accordance with Test Method C 1170.

**5. Apparatus**

**5.1 Molds:**

**5.1.1 Type A Mold**—A cylindrical mold conforming to the requirements of Specification C 470 for 6-in. (152-mm) diameter by 12-in. (305-mm) high reusable molds. Molds shall be made of steel or other hard metal not readily attacked by the cement paste. Aluminum molds shall not be used. Molds shall be equipped with permanently affixed metal slotted brackets on the baseplate so the molds can be rigidly clamped to a vibrating table. The top rim of the mold shall be smooth, plane, and parallel to the bottom of the mold. The bottom of the mold shall provide a watertight seal.

**5.1.2 Type B Mold**—A single-use plastic, cylindrical mold 6 in. (152 mm) in diameter and 12 in. (305 mm) in height. The mold specifications shall conform to Specification C 470 for single-use plastic molds.

**5.1.2.1 Mold Sleeve**—A Type B cylindrical mold shall be inserted into a rigid cylindrical sleeve with a bottom baseplate that is clamped to the vibrating table. The mold sleeve shall be made of steel or other hard metal that does not react with concrete containing portland or other hydraulic cement. The sleeve shall be capable of firmly and vertically holding the plastic mold in place without deformation and shall be slotted vertically with adjustable clamps for tightening around the mold. The sleeve shall be hinged so that it can be opened to remove the mold (Fig. 1) and shall also have permanently affixed slotted metal brackets so the sleeve may be rigidly clamped to the vibrating table. The mold sleeve shall have a

minimum wall thickness of 1/8 in. (3.2 mm), and a minimum baseplate thickness of 1/4 in. (6.4 mm). The inside diameter of the mold sleeve shall be 1/8 ± 1/16 in. (3.2 ± 1.6 mm) larger than the outside diameter of the Type B mold and have a height 1/2 to 1/4 in. (12.8 ± 6.4 mm) less than the height of the Type B mold.

**5.2 Vebe Vibrating Table**—A vibrating table with a 3/4-in. (19-mm) thick steel deck with dimensions of approximately 15 in. (381 mm) in length, 10 1/4 in. (260 mm) in width, and 12 in. (305 mm) in height. The vibrating table shall be constructed in such a manner as to prevent flexing of the table during operation. The table deck shall be activated by an electromechanical vibrator. The total mass of the vibrator and table shall be approximately 210 lb (95 kg). The table shall be level and clamped to a concrete floor or base slab that has sufficient mass to prevent displacement of the apparatus during specimen preparation (Note 2).

**NOTE 2**—The recommended vibrating table for these procedures is the Vebe vibrating table.<sup>6</sup> Testing to date has been performed using this apparatus. An alternative vibrating table may be substituted for the Vebe apparatus provided it meets the specifications for the sinusoidal vibration given in 7.1.

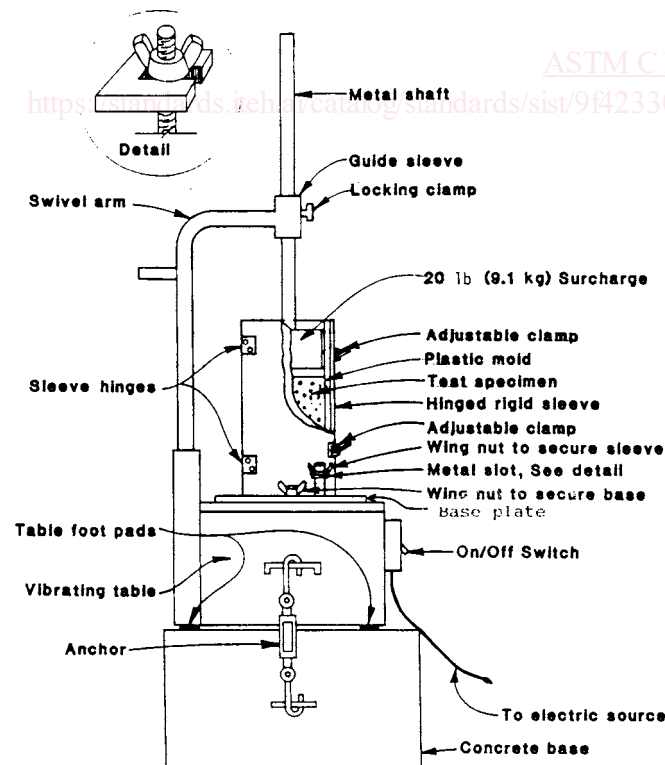
**5.3 Swivel Arm and Guide Sleeve**—A metal guide sleeve with a clamp assembly or other suitable holding device mounted on a swivel arm. The swivel arm and guide sleeve must be capable of holding a metal shaft attached to a 20-lb (9.1-kg) cylindrical mass in a position perpendicular to the vibrating surface and allowing the shaft to slide freely when the clamp is released. The swivel arm must be capable of maintaining the guide sleeve in a locked position directly over the center of the specimens to be vibrated. The swivel arm shall also be capable of being rotated away from the center of the table (Note 3).

**NOTE 3**—The Vebe vibrating table comes equipped with the swivel arm and guide sleeve.

**5.4 Surcharge**—A cylindrical steel mass with a metal shaft at least 18 in. (457 mm) in length and 5/8 ± 1/16 in. (16 ± 2 mm) in diameter attached perpendicularly to and embedded in the center of the mass. The shaft shall slide through the guide sleeve without binding. The surcharge shall have a diameter of 5 3/4 ± 1/8 in. (146 ± 3 mm). The surcharge assembly shall have a mass of 20 ± 0.5 lb (9.1 ± 0.25 kg) including the mass of the metal shaft (Fig. 1). If the surcharge is to be hand held, the length of the shaft may be reduced to about 12 in. (305 mm) and fabricated with a “T” or “D” handle for gripping the surcharge shaft to avoid slipping.

**5.5 Sieve**—A 50-mm (2-in.) sieve conforming to Specification E 11.

**5.6 Small Tools**—Trowels, square-ended shovel and hand scoops, steel trowel, wooden float, wrench, tamping rod, and flashlight as required.



**FIG. 1 Vibrating Table—Cylinder Preparation (Type B Mold)**

<sup>6</sup> The Vebe vibrating table, including cylindrical mold and guide sleeves, is manufactured by SoilTest, 86 Albrecht Drive, P.O. Box 8004, Lake Bluff, IL 60044-9902.