STATE OF CALIFORNIA—BUSINESS, TRANSPORTATION AND HOUSING AGENCY

DEPARTMENT OF TRANSPORTATION
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METHOD OF TEST FOR DETERMINING AIR CONTENT OF FRESHLY MIXED CONCRETE BY THE PRESSURE METHOD

CAUTION: Prior to handling test materials, performing equipment setups, and/or conducting this method, testers are required to read "**SAFETY AND HEALTH**" in Section F of this method. It is the responsibility of the user of this method to consult and use departmental safety and health practices and determine the applicability of regulatory limitations before any testing is performed.

A. SCOPE

1. The procedure for determining the air content of freshly mixed concrete by the pressure method is described in this test method which is a modification of ASTM Designation: C 231.

2. This method is intended for use with concrete made with relatively dense aggregates. It is not applicable to concrete made with lightweight aggregate or air-cooled blast furnace slag. For these materials use ASTM Designation: C 173.

B. APPARATUS

1. Air Meter: Commercially available air meter of the modified Washington type consisting of a base and top section, and furnished with all accessories necessary for calibration. The directions outlined below under Operation of Apparatus apply to the brands used by the California Department of Transportation. These meters operate on the principle of equalizing a known volume of air at a known pressure in a sealed chamber with an unknown volume of air in the concrete sample. Calibration and operation of these meters is not affected by barometric pressures.

2. Tamping Rod: A round, straight, steel, rod 15 to 16 mm in diameter and approximately 0.6 m in length. The tamping end shall be rounded to a hemispherical tip with a diameter equal to the rod.

3. Strike-off Bar: A flat, straight bar of steel or other suitable material.

4. Scoop: A small metal scoop.

5. Syringe: A small rubber ear syringe.

C. OPERATION OF APPARATUS

Use the same sampling and rodding procedure for all types of air meters. Obtain the sample of concrete for the air content determination in accordance with the applicable provisions of ASTM Designation: C 172.

1. Rodding and Tapping: Using the scoop, fill the base with freshly mixed concrete in three layers of equal depth. Rod each layer 25 times with the tamping rod, distributing the strokes evenly over the surface of the layer. After rodding each layer, tap the sides of the base with the hand or a wood stake to remove entrapped air along the sides and to close any holes left by the tamping rod. In

rodding the first layer, penetrate nearly full depth into the layer, but avoid striking the bottom of the base. In rodding the second and third layers, penetrate slightly into the layer below with each stroke.

2. Striking Off: Strike off the base, level full, with the straightedge and clean the top edge of the base to ensure an airtight seal with the cover.

3. Completion of the Testing Using a Press-Ur-Meter:

   a. Clamp the lid on with both petcocks open.

   b. Using the syringe, inject water through one petcock until all air is expelled through the opposite petcock. Jar meter gently to remove entrapped air. Leave petcock open.

   c. With built-in pump, pump air in sealed chamber to "initial pressure" line on gauge. Wait a few seconds for the compressed air to cool, then stabilize gauge hand at initial pressure line by pumping or bleeding off air as needed by "cracking" cap over air valve.

   d. Close *both* petcocks and press down on thumb lever to release the air into the base. Hold lever down a few seconds and tap gauge lightly with fingers until gauge hand stabilizes.

   e. Read the percent of entrained air on the dial.

   f. Open petcocks slowly to release pressure, then remove the cover. Clean the base, cover, and petcock opening thoroughly. Take care not to damage the top edge of the base.

4. Completion of the Test Using a Techkote White Meter:

   a. Clamp lid onto base with petcocks open. Be sure main air valve on top of air chamber is closed.

   b. Pour water into funnel until all air is expelled through opposite petcock. Jar meter gently to remove any entrapped air. Close both petcocks.

   c. With built-in pump, pump air in sealed chamber until gauge hand reaches the red line. (A little to one side or the other of the red lines makes no difference as long as the initial starting hand has been passed.) By bleeding air from the chamber and tapping the gauge gently with the fingers, bring the gauge hand to rest exactly on the initial starting pointer.

   d. Open main air valve to release air into the base. Tap gauge gently to stabilize gauge hand. Read percent of entrained air from the dial.

   e. Close Main Air Valve. Open petcocks to release air pressure, then remove the cover. Clean the base, cover, and petcock openings thoroughly. Take care not to damage the top edge of the base.

D. CALIBRATION OF METER GAUGE — PRESSURE METHOD

Every brand of air meter has a method of calibration using a "built-in" system peculiar to the particular brand. Instructions for this procedure are included with the meter when purchased and should be kept with the meter at all times. Summarized instructions for the method of calibration for two brands, Techkote White and Press-Ur-Meter, are covered in California Test 115.

E. PRECAUTIONS

1. Clean all concrete thoroughly from the base and lid of the meters. Special attention should be paid to keep all valves and openings free of concrete.

2. Take care to prevent damage to the top edge of the base. A tight seal is necessary for proper operation of any model of pressure-type air meter.

3. Take care to keep the dial gauge out of water at all times.

4. Do not store an air meter with the lid clamped tightly to the base.

5. Do not pump air pressure in the sealed chambers past the indicated limit on the gauge dial.

F. SAFETY AND HEALTH

Prior to handling, testing or disposing of any waste materials, testers are required to read: Part A (Section 5.0), Part B (Sections: 5.0, 6.0 and 10.0) and Part C (Section 1.0) of Caltrans Laboratory Safety Manual. Users of this method do so at their own risk.

REFERENCES:

ASTM Designation C-231
California Tests 115, 539, and 543

End of Text (California Test 504 contains 3 pages)