Standard Method of Test for

Capping Cylindrical Concrete Specimens

AASHTO Designation: T 231-17

Technical Section: 3c, Hardened Concrete

Release: Group 1 (April 2017)

ASTM Designation: C617-15

AASHTO

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1. SCOPE

1.1. This method covers apparatus, materials, and procedures for capping freshly molded concrete cylinders with neat cement and hardened cylinders and drilled concrete cores with high-strength gypsum plaster or sulfur mortar.

1.2. The values stated in SI units 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. Combining values from the two systems may result in nonconformance with the standard.

1.3. *This standard may involve hazardous materials, operations, and equipment. This standard does not purport to address all of the safety concerns 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*. For specific precaution statements, see Sections 4.3 and 6.2.4.1.

2. REFERENCED DOCUMENTS

2.1. *AASHTO Standards*:

- M 85, Portland Cement
- M 240M/M 240, Blended Hydraulic Cement
- T 106M/T 106, Compressive Strength of Hydraulic Cement Mortar (Using 50-mm or 2-in. Cube Specimens)

2.2. *ASTM Standards*:

- C287, Standard Specification for Chemical-Resistant Sulfur Mortar
- C1231/C123M, Standard Practice for Use of Unbonded Caps in Determination of Compressive Strength of Hardened Concrete Cylinders

2.3. *ANSI Standard*:

- B 46.1, Standard for Surface Texture, Surface Roughness, Waviness and Lay

3. SIGNIFICANCE AND USE

3.1. This practice describes procedures for providing plane surfaces on the end surfaces of freshly molded concrete cylinders, hardened cylinders, or drilled concrete cores when the end surfaces do not conform with the planeness and perpendicularity requirements of applicable standards. ASTM C1231/C123M describes alternative procedures using unbonded caps or pad caps.

4. CAPPING EQUIPMENT

4.1. *Capping Plates*—Neat cement caps and high-strength gypsum plaster caps shall be formed against a glass plate at least 6 mm (0.25 in.) thick or a machined metal plate at least 11 mm (0.45 in.) thick (Note 1) on a polished plate of granite or diabase at least 75 mm (3 in.) thick. Sulfur mortar caps shall be formed against similar metal or stone plates. In all cases, plates shall be at least 25 mm (1 in.) greater in diameter than the test specimen and the working surfaces shall not depart from a plane by more than 0.05 mm (0.002 in.) in 150 mm (6 in.). The surface roughness of newly finished metal plates shall not exceed that set forth in Table 4 of the American National Standard for Surface Texture (ANSI B 46.1) or 0.003 mm (125 μin.) for any type of surface and direction of lay. The surface when new shall be free of gouges, grooves, or indentations beyond those caused by the finishing operation. Metal plates that have been in use shall be free of gouges, grooves, or indentations greater than 0.25 mm (0.010 in.) deep or greater than 32 mm^2 (0.05 $in.^2$) in surface area.

Note 1—A Rockwell hardness of HRC 48 is suggested.

4.2. *Alignment Devices*—Suitable alignment devices such as guide bars or bull's-eye levels shall be used in conjunction with capping plates to ensure that no single cap will depart from the perpendicularity of the cylindrical specimen by more than 0.5 degrees (see Note 2). The same requirement is applicable to the relationship between the axis of the alignment device and the surface of a capping plate when guide bars are used. In addition, the location of each bar with respect to its plate must be such that no cap will be off-centered on a test specimen by more than 1.6 mm (0.06 in.).

Note 2—A deviation from perpendicularity of 0.5 degrees is equal to a slope of approximately 1 mm in 100 mm ($^1/_4$ in. in 12 in.).

4.3. *Melting Pots for Sulfur Mortars*—Pots used for melting sulfur mortars shall be equipped with automatic temperature controls and shall be made of metal or lined with a material that is nonreactive with molten sulfur.

Caution—Melting pots equipped with peripheral heating will ensure against accidents during reheating of cooled sulfur mixtures that have a crusted-over surface. When using melting pots not so equipped, a buildup of pressure under the hardened surface crust on subsequent reheating may be avoided by use of a metal rod that contacts the bottom of the pot and projects above the surface of the fluid sulfur mix as it cools. The rod should be of sufficient size to conduct enough heat to the top on reheating to melt a ring around the rod first and thus avoid the development of pressure. A large metal ladle can be substituted for the rod.

Sulfur melting pots should be used under a hood to exhaust the fumes to outdoors. Heating over an open flame is dangerous because the flash point of sulfur is approximately 227°C (440°F) and the mixture can ignite due to overheating. Should the mixture start to burn, covering will snuff out the flame. The pot should be recharged with fresh material after the flame has been extinguished.

5. CAPPING MATERIALS

5.1. The strength of the capping material and the thickness of the caps shall conform to the requirements of Table 1.