Designation: C 191 – 99

AMERICAN SOCIETY FOR TESTING AND MATERIALS
100 Barr Harbor Dr., West Conshohocken, PA 19428
Reprinted from the Annual Book of ASTM Standards. Copyright ASTM

American Association State
Highway and Transportation Officials Standard
AASHTO No.: T131

Standard Test Method for Time of Setting of Hydraulic Cement by Vicat Needle[1]

This standard is issued under the fixed designation C 191; 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 method covers determination of the time of setting of hydraulic cement by means of the Vicat needle.

NOTE 1—For the method for determining time of setting by Gillmore needles, see Test Method C 266.

1.2 The values stated in SI units are to be regarded as the standard. Values in parentheses are for information only.

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.* See Note 2 for a specific warning statement.

NOTE 2—**Warning:** Fresh hydraulic cementitious mixtures are caustic and may cause chemical burns to skin and tissue upon prolonged exposure. The use of gloves, protective clothing, and eye protection is recommended. Wash contact area with copious amounts of water after contact. Wash eyes for a minimum of 15 min. Avoid exposure of the body to clothing saturated with the liquid phase of the unhardened material. Remove contaminated clothing immediately after exposure.

2. Referenced Documents

2.1 *ASTM Standards:*

C 187 Test Method for Normal Consistency of Hydraulic Cement[2]

C 266 Test Method for Time of Setting of Hydraulic-Cement Paste by Gillmore Needles[2]

C 305 Practice for Mechanical Mixing of Hydraulic Cement Pastes and Mortars of Plastic Consistency[2]

C 490 Practice for Use of Apparatus for the Determination of Length Change of Hardened Cement Paste, Mortar, and Concrete[2]

3. Apparatus

3.1 *Scales*—The scales shall conform to the following requirements: On scales in use the permissible variation at a load of 9.8 N shall be ± 0.01 N. The permissible variation on new scales shall be one half of this value. The sensibility reciprocal[3] shall be not greater than twice the permissible variation.

3.2 *Weights*—The permissible variations on weights in use in weighing the cement shall be as prescribed in Table 1. The permissible variations on new weights shall be one half of the values in Table 1.

3.3 *Glass Graduates*, 200 or 250-mL capacity, and conforming to the requirements of Specification C 490.

3.4 *Vicat Apparatus*—The Vicat apparatus shall consist of a frame, *A*, Fig. 1, bearing a movable rod, *B*, weighing 300 g, one end, *C*, the plunger end, being 10 mm in diameter for a distance of at least 50 mm and the other end having a removable steel needle, *D*, 1 mm in diameter and 50 mm in length. The rod *B* is reversible, and can be held in any desired position by a set screw, *E*, and has an adjustable indicator, *F*, which moves over a scale (graduated in millimetres) attached to the frame, *A*. The paste is held in a conical ring, *G*, resting on a plate of similar planeness, corrosivity, and absorptivity to that of glass, *H*, about 100 mm square. The ring shall be made of a noncorroding, nonabsorbing material, and shall have an inside diameter of 70 mm at the base and 60 mm at the top and a height of 40 mm. In addition to the above, the Vicat apparatus shall conform to the following requirements:

Weight of plunger	300 ± 0.5 g (0.661 lb ± 8 grains)
Diameter of larger end of plunger	10 ± 0.05 mm (0.394 ± 0.002 in.)
Diameter of needle	1 ± 0.05 mm (0.039 ± 0.002 in.)
Inside diameter of ring at bottom	70 ± 3 mm (2.75± 0.12 in.)
Inside diameter of ring at top	60 ± 3 mm (2.36± 0.12 in.)
Height of ring	40 ± 1 mm (1.57 ± 0.04 in.)
Graduated scale	The graduated scale, when compared with a scale accurate to within 0.1 mm at all points, shall not show any point greater than 0.25 mm.

4. Temperature and Humidity

4.1 The temperature of the air in the vicinity of the mixing slab, the dry cement, molds, and base plates shall be maintained between 20 and 27.5°C (68 and 81.5°F). The temperature of the mixing water and of the moist closet or moist room shall not vary from 23°C (73.4°F) by more than ± 1.7°C (3°F).

[1] This method is under the jurisdiction of ASTM Committee C-1 on Cement and is the direct responsibility of Subcommittee C01.30 on Time of Set.

Current edition approved Jan. 10, 1999. Published May 1999. Originally published as C 191 – 44. Last previous edition C 191 – 92.

[2] *Annual Book of ASTM Standards*, Vol 04.01.

[3] Generally, defined, the sensibility reciprocal is the change in load required to change the position of rest of the indicating element or elements of a nonautomatic-indicating scale a definite amount at any load. For more complete definition, see "Specifications, Tolerances, and Regulations for Commercial Weighing and Measuring Devices," *Handbook H44*, National Bureau of Standards, September 1949, pp. 92 and 93.