
Standard Method of Test for Time of Setting of Hydraulic Cement Paste by Gillmore Needles

AASHTO Designation: T 154-22¹

Technically Revised: 2022

Technical Subcommittee: 3a, Cement, Lime, and Concrete Materials

ASTM Designation: C266-20



**American Association of State Highway and Transportation Officials
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1. SCOPE

- 1.1. This test method covers the determination of the time of setting of hydraulic cement paste by means of the Gillmore needles.
- 1.2. The values stated in SI units are to be regarded as standard. No other units of measurement are included in this 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.*
Warning—Fresh hydraulic cementitious mixtures are caustic and may cause chemical burns to skin and tissue upon prolonged exposure.
- 1.4. The text of this standard references notes and footnotes that provide explanatory material. These notes and footnotes (excluding those in tables and figures) shall not be considered as requirements of the standard.
- 1.5. *The quality of the results produced by this standard are dependent on the competence of the personnel performing the procedure and the capability, calibration, and maintenance of the equipment used. Agencies that meet the criteria of R 18 are generally considered capable of competent and objective testing/sampling/inspection/etc. Users of this standard are cautioned that compliance with R 18 alone does not completely assure reliable results. Reliable results depend on many factors; following the suggestions of R 18 or some similar acceptable guideline provides a means of evaluating and controlling some of those factors.*

2. REFERENCED DOCUMENTS

- 2.1. *AASHTO Standards:*
- M 201, Mixing Rooms, Moist Cabinets, Moist Rooms, and Water Storage Tanks Used in the Testing of Hydraulic Cements and Concretes
 - R 18, Establishing and Implementing a Quality Management System for Construction Materials Testing Laboratories

- R 70, Use of Apparatus for the Determination of Length Change of Hardened Cement Paste, Mortar, and Concrete
- R 71, Sampling and Amount of Testing of Hydraulic Cement
- T 107M/T 107, Autoclave Expansion of Hydraulic Cement
- T 129, Amount of Water Required for Normal Consistency of Hydraulic Cement Paste
- T 162, Mechanical Mixing of Hydraulic Cement Pastes and Mortars of Plastic Consistency

2.2. *ASTM Standards:*

- C219, Standard Terminology Relating to Hydraulic and Other Inorganic Cements
- C670, Standard Practice for Preparing Precision and Bias Statements for Test Methods for Construction Materials
- C1005, Standard Specification for Reference Masses and Devices for Determining Mass and Volume for Use in the Physical Testing of Hydraulic Cements
- D1193, Standard Specification for Reagent Water

2.3. *Other Standard:*

- Azari, H. and R. Lutz. *NCHRP Web-Only Document 140: Precision Estimates for AASHTO Test Methods T 186, T 154, and T 22, Determined Using CCRL Proficiency Sample Data*. National Cooperative Highway Research Program, Transportation Board of the National Academies, Washington, DC, 2009, 48 pp.
http://onlinepubs.trb.org/onlinepubs/nchrp/nchrp_w140.pdf

3. TERMINOLOGY

- 3.1. Refer to ASTM C219 for definitions of terms.

4. SUMMARY OF TEST METHOD

- 4.1. Sufficient water is added to the cement that is being tested to produce a paste of normal consistency. A specimen is molded from this paste and is tested for time of setting by means of the Gillmore initial and final needles. The Initial Time of Setting is the time elapsed between initial contact of cement and water and the time when the Gillmore initial needle does not leave a complete circular impression in the paste surface. The Final Time of Setting is the time elapsed between initial contact of cement and water and the time when the Gillmore final needle does not leave a complete circular impression in the paste surface.

5. SIGNIFICANCE AND USE

- 5.1. The purpose of this test method is to establish whether a cement complies with a specification limit on Gillmore time of setting.

6. APPARATUS

- 6.1. *Flat Trowel*—Having a sharpened straight-edged steel blade 100 to 150 mm in length. The edges, when placed on a plane surface, shall not depart from straightness by more than 1 mm.
- 6.2. *Mixer, Bowl, Paddle, and Scraper*—Conforming to the requirements of T 162.
- 6.3. *Glass Graduates*—200- or 250-mL capacity, conforming to the requirements of R 70.