



Designation: ~~C266—18~~ C266 – 20

## Standard Test Method for Time of Setting of Hydraulic-Cement Paste by Gillmore Needles<sup>1</sup>

This standard is issued under the fixed designation C266; 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 reappraisal. A superscript epsilon ( $\epsilon$ ) indicates an editorial change since the last revision or reappraisal.

### 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 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.~~

~~**Warning:** Fresh hydraulic cementitious mixtures are caustic and may cause chemical burns to skin and tissue upon prolonged exposure.<sup>2</sup>~~

1.3 The text of this standard references notes and footnotes which provide explanatory material. These notes and footnotes (excluding those in tables and figures) shall not be considered as requirements of the standard.

~~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, health, and environmental 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.)<sup>2</sup>~~

1.5 This international standard was developed in accordance with internationally recognized principles on standardization established in the Decision on Principles for the Development of International Standards, Guides and Recommendations issued by the World Trade Organization Technical Barriers to Trade (TBT) Committee.

### 2. Referenced Documents

#### 2.1 ASTM Standards:<sup>3</sup>

[C151/C151M Test Method for Autoclave Expansion of Hydraulic Cement](#)

[C183/C183M Practice for Sampling and the Amount of Testing of Hydraulic Cement](#)

[C187 Test Method for Amount of Water Required for Normal Consistency of Hydraulic Cement Paste](#)

[C219 Terminology Relating to Hydraulic and Other Inorganic Cements](#)

[C305 Practice for Mechanical Mixing of Hydraulic Cement Pastes and Mortars of Plastic Consistency](#)

<sup>1</sup> This test method is under the jurisdiction of ASTM Committee C01 on Cement and is the direct responsibility of Subcommittee C01.30 on Time of Set. Current edition approved Oct. 1, 2018/Oct. 1, 2020. Published October 2018/November 2020. Originally approved in 1951. Last previous edition approved in 2015/2018 as ~~C266—15~~-C266 – 18. DOI: [10.1520/C0266-18](https://doi.org/10.1520/C0266-18); [10.1520/C0266-20](https://doi.org/10.1520/C0266-20).

<sup>2</sup> Section on Safety, Manual of Cement Testing, *Annual Book of ASTM Standards*, Vol 04.01.

<sup>3</sup> For referenced ASTM standards, visit the ASTM website, [www.astm.org](http://www.astm.org), or contact ASTM Customer Service at [service@astm.org](mailto:service@astm.org). For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.

\*A Summary of Changes section appears at the end of this standard

- C511 Specification for Mixing Rooms, Moist Cabinets, Moist Rooms, and Water Storage Tanks Used in the Testing of Hydraulic Cements and Concretes
- C670 Practice for Preparing Precision and Bias Statements for Test Methods for Construction Materials
- C1005 Specification for Reference Masses and Devices for Determining Mass and Volume for Use in the Physical Testing of Hydraulic Cements
- D1193 Specification for Reagent Water

### 3. Terminology

3.1 Refer to Terminology ~~C219~~ for definitions of terms.

#### 3.1 Definitions:

3.1.1 For definitions of terms used in this test method, refer to Terminology ~~C219~~.

### 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 Practice ~~C305~~.

6.3 *Glass Graduates*, 200 or 250 mL capacity, conforming to the requirements of Specification ~~C1005~~.

6.4 *Mass Determining Devices*, conforming to the requirements of Specification ~~C1005~~. The devices for determining mass shall be evaluated for continuing precise performance utilizing the procedure in Specification ~~C1005~~, Appendix X1, using a verification check mass of approximately 1000 g.

6.5 *Plane Non-absorptive Plates*, 100 mm ± 5 mm square, of similar planeness, corrosivity, and absorptivity to that of glass (see Test Method ~~C187~~ Fig. 1, item H).

6.6 *Gillmore Needles*, conforming to the following requirements:

6.6.1 The initial time of setting needle shall have a mass of  $113.4 \pm 0.5$  g and a tip diameter of  $2.12 \pm 0.05$  mm.

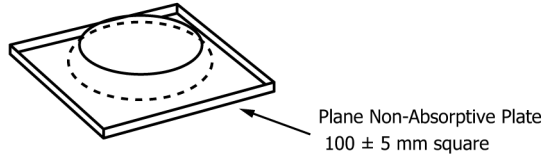
6.6.2 The final time of setting needle shall have a mass of  $453.6 \pm 0.5$  g and a tip diameter of  $1.06 \pm 0.05$  mm.

6.6.3 The needle tips shall be cylindrical for a distance of  $4.8 \pm 0.5$  mm. The needle ends shall be plane and at right angles to the axis of the rod and shall be maintained in a clean condition (See ~~see~~ Note 1).

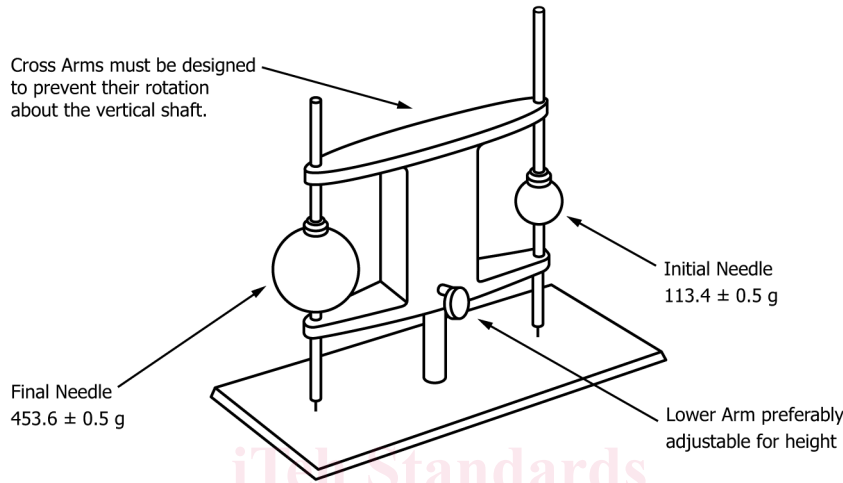
6.7 Inspect and document Section 6 apparatus for conformance to the requirements of this test method at least every 2½ years (see Note 2).

NOTE 1—The Gillmore needles should preferably be mounted as shown in Fig. 1(b).

Cement Paste Pat  
 Base diameter  $76 \pm 13$  mm  
 Top diameter  $50 \pm 13$  mm  
 Center thickness  $13 \pm 3$  mm

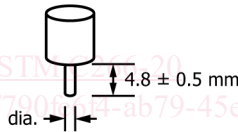


(a) Pat with Top Surface Flattened for Determining Time of Setting by Gillmore Method



(b) Gillmore Apparatus

Replaceable tips may be made of stock drill rod or wire tempered after shaping and held by suitable chuck or other fastener



(c) Detail of Gillmore Apparatus Needle Tips

FIG. 1 Gillmore Apparatus and Test Specimen

NOTE 2—Specification C1005 requires annual compliance checks for the reference masses and for the devices for determining mass.

## 7. Reagents

7.1 *Mixing Water*—Potable water is satisfactory for routine tests. For all referee and cooperative tests, reagent water conforming to the requirements of Specification D1193 for Type III or Type IV grade of reagent water shall be used.

## 8. Sampling

8.1 When the test is part of acceptance testing, sample the cement in accordance with Practice C183/C183M.

## 9. Conditioning

9.1 Maintain the temperature and humidity of the room, dry materials, paddle, bowl, and plane non-absorptive plates at  $23.0 \pm 3.0^\circ\text{C}$ . Maintain mixing room and the temperature of the mixing water at  $23.0 \pm 2.0^\circ\text{C}$  in accordance with Specification C511 requirements for cement mixing rooms.

9.2 Maintain the relative humidity. The mixing apparatus and dry materials shall be within the temperature range of the mixing room at not less than 50% prior to testing.