



Designation: C 359 – 03a

Standard Test Method for Early Stiffening of Hydraulic Cement (Mortar Method)¹

This standard is issued under the fixed designation C 359; 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 test method covers the determination of early stiffening in hydraulic-cement mortar.

1.2 The values stated in SI units are the standard. The 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. (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

2. Referenced Documents

2.1 ASTM Standards:³

- C 183 Practice for Sampling and the Amount of Testing of Hydraulic Cement
- C 185 Test Method for Air Content of Hydraulic Cement Mortar
- C 187 Test Method for Normal Consistency of Hydraulic Cement
- C 305 Practice for Mechanical Mixing of Hydraulic Cement Pastes and Mortars of Plastic Consistency
- C 490 Practice for Use of Apparatus for the Determination

of Length Change of Hardened Cement Paste, Mortar, and Concrete

- C 670 Practice for Preparing Precision and Bias Statements for Test Methods for Construction Materials
- C 778 Specification for Standard Sand
- C 1005 Specification for Reference Masses and Devices for Determining Mass for Use in the Physical Testing of Hydraulic Cements
- D 1193 Specification for Reagent Water
- E 1 Specification for ASTM Thermometers

3. Terminology

3.1 Definitions:

3.1.1 *early stiffening*—the early development of stiffness in the working characteristics of a hydraulic-cement paste, mortar, or concrete; varieties include false set and flash set.

3.1.2 *false set*—the early development of stiffness in the working characteristics of a hydraulic-cement paste, mortar, or concrete without the evolution of much heat, which stiffness can be dispelled and plasticity regained by further mixing without addition of water; also known as “grab set,” “premature stiffening,” “hesitation set,” and “rubber set.”

3.1.3 *flash set*—the early development of stiffness in the working characteristics of a hydraulic-cement paste, mortar, or concrete, usually with the evolution of considerable heat, which stiffness cannot be dispelled nor can the plasticity be regained by further mixing without addition of water; also known as “quick set.”

4. Summary of Test Method

4.1 A mortar is prepared with the cement to be tested, using specified quantities of cement, standard sand, and an amount of water that will produce a mortar with an initial penetration of 46 ± 3 mm, using the modified Vicat apparatus. Measurements of penetration are made at stipulated intervals after the beginning of the mixing procedure. Upon completion of the first series of penetration measurements, the mortar is returned to the mixer to be remixed. Following the remix procedure, an additional penetration, termed the remix penetration, is determined. The report is a tabulation of the penetration measurements and the amount of mixing water used.

¹ 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.

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

³ For referenced ASTM standards, visit the ASTM website, www.astm.org, or contact ASTM Customer Service at service@astm.org. For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.