



Standard Test Method for The Laboratory Determination of the Time of Setting of Hydraulic-Cement Mortars Containing Additives for Shotcrete by the Use of Gillmore Needles¹

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^{ε1} NOTE—Title, Section 2, and 4.4 editorially corrected January 2001.

1. Scope

1.1 This is a laboratory test method that covers the determination of the time of setting of hydraulic-cement mortars containing additives for shotcrete for comparison with control mixes containing no additives or to compare the performance of shotcrete mixtures which contain additives that produce rapid setting or rapid stiffening of shotcrete.

1.2 The values stated in SI units (see IEEE/ASTM SI 10) are 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, 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.*

2. Referenced Documents

2.1 ASTM Standards:

C 150 Specification for Portland Cement²

C 185 Test Method for Air Content of Hydraulic Cement Mortar

C 266 Test Method for Time of Setting of Hydraulic Cement Paste by Gillmore Needles²

C 305 Practice for Mechanical Mixing of Hydraulic Cement Pastes and Mortars of Plastic Consistency²

C 490 Practice for use of Apparatus for the Determination of Length Change of Hardened Cement Paste, Mortar and Concrete²

C 778 Specification for Standard Sand²

C 1005 Specification for Masses and Devices for Determining Mass for Use in the Physical Testing of Hydraulic Cements²

C 1141 Specification for Admixtures for Shotcrete³

D 1193 Specification for Reagent Water⁴

IEEE/ASTM SI 10 Standard for Use of the International System of Units (SI): The Modern Metric System⁵

3. Summary of Test Method

3.1 A mortar consisting of the sand, hydraulic cement, and water to be tested is proportioned by mass. The appropriate admixture or admixtures are added and a specimen is prepared from the mortar and tested for time of setting by means of Gillmore initial and final needles. A time of setting determination is then made for initial and final time of setting for each specimen. The time of setting shall be compared to a treated control mixture to demonstrate the effect of the admixture if such a comparison is the purpose of the study.

4. Significance and Use

4.1 The performance of an admixture for shotcrete in the field varies with the composition of the hydraulic cement and sand combination. Since this test method involves the determination of time of setting of a particular combination of hydraulic cement, sand and an admixture, it therefore provides information on the suitability for use of that particular combination in the field.

4.2 The time of setting of the combination established in the laboratory does not necessarily indicate the time of setting this combination will produce in actual shotcreting in the field.

4.3 This method is used to determine the effect on time of setting of mortars containing admixtures as compared to a control mortar.

4.4 The test method is used for comparison in laboratory pre-evaluation studies to demonstrate the effect of shotcrete admixtures in mortar compared with plain mortar and can be used to demonstrate or compare the performance of shotcrete admixtures which produce rapid setting or rapid rheological stiffening of shotcrete.

4.5 The test method is used to evaluate the relative performance of more than one shotcrete admixture for comparison of performance.

¹ This practice is under the jurisdiction of ASTM Committee C09 on Concrete and Concrete Aggregates and is the direct responsibility of Subcommittee C 09.46 on Shotcrete.

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² Annual Book of ASTM Standards, Vol 04.01.

³ Annual Book of ASTM Standards, Vol 04.02.

⁴ Annual Book of ASTM Standards, Vol 11.01.

⁵ Annual Book of ASTM Standards, Vol 14.02.