



Standard Test Method for Measuring Consistency and Working Time of Self-Flowing Castable Refractories¹

This standard is issued under the fixed designation C 1446; 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 the consistency (degree of self-flow) and working time of self-flowing castable refractories.

1.2 The values stated in inch-lb. units are to be regarded as the standard. The values given 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.*

2. Referenced Documents

2.1 ASTM Standards:

C 71 Terminology Relating to Refractories²

C 230 Specification for Flow Table for Use in Tests of Hydraulic Cement³

C 860 Practices for Determining the Consistency of Refractory Castable Using the Ball-in-Hand Test²

C 862 Practice for Preparing Refractory Concrete Specimens by Casting²

3. Terminology

3.1 Definitions of Terms Specific to This Standard:

3.1.1 *consistency of self-flowing castable refractories*—the degree of mobility (self-flow) of the refractory castable under its own weight as described in this test method at the specified times after adding liquid to the mixer.

3.1.2 *working time of self-flowing castable refractories*—the elapsed time from the first addition of liquid during mixing until the mix will only achieve 25 % self-flow using the procedure described in this test method.

4. Summary of Test Method

4.1 The castable refractory is mixed with a tempering liquid and the percentage of self-flow is measured at specified time intervals until self-flow is determined to be less than 25 %. Self-flow is the percent increase in the diameter of the sample

after removing the Specification C 230 cone mold and allowing the specimen to flow (spread) under its own weight for 60 s. Graph paper, or a functionally equivalent method, is used to interpolate between the last reading greater than 25 % self-flow and the first reading less than 25 % self-flow. Interpolation should be done assuming decay is linear between these two readings. The interpolated elapsed time from the first addition of liquid to the mixer to 25 % self-flow is the working time. If working time is not of interest, consistency at 10 min after adding liquid to the mixer is the only self-flow to be measured.

5. Significance and Use

5.1 This test method is used to measure the consistency (degree of self-flow) that a castable refractory demonstrates at a given level of tempering liquid at specified time intervals after the liquid is added. A self-flow of 25 % has been selected as the minimum at which a mix can be poured into typical molds or forms in normal practice.

5.2 Castable refractories which are self-flowing at one level of tempering liquid will require vibration for placement at some lower level of tempering liquid. At the tempering liquid levels which require vibration or tamping for placement, the castable refractory should be characterized using test methods which are appropriate for castable refractories designed for vibration placement.

5.3 This test method is not appropriate for determining the pumpability of castable refractories.

6. Interferences (Factors Known to Affect Results)

6.1 During method development, a ruggedness evaluation was performed using a 5 % cement, 17 % reactive alumina, and 78 % tabular alumina castable. Several factors were found to cause statistically significant effects on the measured results. See ASTM Research Report Number (to be added when available).

6.1.1 *Amount of Mixing Liquid*—The amount of mixing liquid affects the measured results for typical self-flowing castable refractories unless added by weight to within ± 0.002 lb (± 1 g) of the target weight for a 16.52-lb (7500-g) sample weight. The target liquid level is a percentage of the dry weight of the batch.

6.1.2 *Temperature*—During ruggedness testing the effect of temperature was evaluated. The test mix, tempering liquid, and room temperature were controlled to the same targets. When

¹ This test method is under the jurisdiction of ASTM Committee C-8 on Refractories and is the direct responsibility of Subcommittee

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² Annual Book of ASTM Standards, Vol 15.01.

³ Annual Book of ASTM Standards, Vol 04.01.