



Standard Practice for Evaluating Early Hydration of Hydraulic Cementitious Mixtures Using Thermal Measurements¹

This standard is issued under the fixed designation C1753/C1753M; 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.

^{ε1} NOTE—The designation was corrected editorially in June 2016 to conform with the units statement (1.3).

1. Scope

1.1 This practice describes the apparatus and procedure for evaluating relative differences in early hydration of hydraulic cementitious mixtures such as paste, mortar, or concrete, including those containing chemical admixtures, various supplementary cementitious materials (SCMs), and other finely divided materials, by measuring the temperature history of a specimen.

1.2 Calorimetry is the measurement of heat lost or gained during a chemical reaction such as cement hydration; calorimetric measurements as a function of time can be used to describe and evaluate hydration and related early-age property development. Calorimetry may be performed under isothermal conditions (as described in Practice C1679) or under adiabatic or semi-adiabatic conditions. This practice cannot be described as calorimetry because no attempt is made to measure or compute the heat evolved from test specimens due to hydration, but it can in many cases be used for similar evaluations. Variables that should be considered in the application of this practice are discussed in the Appendix.

1.3 *Units*—The values stated in either SI units or inch-pound units shall be regarded separately as standard. The values stated in each system may not be exact equivalents; therefore, each system must be used independently of the other. Combining values from the two systems may result in non-conformance with the standard. Some values have only SI units because the inch-pound equivalents are not used in practice.

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 and health practices and determine the applicability of regulatory limitations prior to use.*

NOTE 1—**Warning:** Fresh hydraulic cementitious mixtures are caustic

and may cause chemical burns to skin and tissue upon prolonged exposure.²

2. Referenced Documents

2.1 ASTM Standards:³

- C39/C39M Test Method for Compressive Strength of Cylindrical Concrete Specimens
- C125 Terminology Relating to Concrete and Concrete Aggregates
- C172/C172M Practice for Sampling Freshly Mixed Concrete
- C192/C192M Practice for Making and Curing Concrete Test Specimens in the Laboratory
- C219 Terminology Relating to Hydraulic Cement
- C305 Practice for Mechanical Mixing of Hydraulic Cement Pastes and Mortars of Plastic Consistency
- C403/C403M Test Method for Time of Setting of Concrete Mixtures by Penetration Resistance
- C494/C494M Specification for Chemical Admixtures for Concrete
- C1005 Specification for Reference Masses and Devices for Determining Mass and Volume for Use in the Physical Testing of Hydraulic Cements
- C1679 Practice for Measuring Hydration Kinetics of Hydraulic Cementitious Mixtures Using Isothermal Calorimetry

3. Terminology

3.1 *Definitions*—For definitions of terms used in this practice, refer to Terminology C125, Terminology C219, and Practice C1679.

3.2 Definitions of Terms Specific to This Standard:

3.2.1 *adiabatic, adj*—occurring without exchange of heat with the environment.

¹ This practice is under the jurisdiction of ASTM Committee C09 on Concrete and Concrete Aggregates and is the direct responsibility of Subcommittee C09.48 on Performance of Cementitious Materials and Admixture Combinations.

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² Section on Safety Precautions, Manual of Aggregate and Concrete Testing, *Annual Book of ASTM Standards*, Vol. 04.02.

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.