



Standard Practice for Estimating Concrete Strength by the Maturity Method¹

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1. Scope

1.1 This practice provides a procedure for estimating concrete strength by means of the maturity method. The maturity index is expressed either in terms of the temperature-time factor or in terms of the equivalent age at a specified temperature.

1.2 This practice requires establishing the strength-maturity relationship of the concrete mixture in the laboratory and recording the temperature history of the concrete for which strength is to be estimated.

1.3 The values stated in SI units are to be regarded as 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 and health practices and determine the applicability of regulatory limitations prior to use.*

2. Referenced Documents

2.1 ASTM Standards:

C 39 Test Method for Compressive Strength of Cylindrical Concrete Specimens²

C 109/C 109M Test Method for Compressive Strength of Hydraulic Cement Mortars (Using 2-in. or 50-mm Cube Specimens)³

C 192/C 192M Practice for Making and Curing Concrete Test Specimens in the Laboratory²

C 403/C 403M Test Method for Time of Setting of Concrete Mixtures by Penetration Resistance²

C 511 Specification for Moist Cabinets, Moist Rooms, and Water Storage Tanks Used in the Testing of Hydraulic Cements and Concretes³

C 684 Test Method for Making, Accelerated Curing, and Testing of Concrete Compression Test Specimens²

C 803/C 803M Test Method for Penetration Resistance of Hardened Concrete²

C 873 Test Method for Compressive Strength of Concrete Cylinders Cast in Place in Cylindrical Molds²

C 900 Test Method for Pullout Strength of Hardened Concrete²

C 918 Test Method for Measuring Early-Age Compressive Strength and Projecting Later-Age Strength²

C 1150 Test Method for the Break-Off Number of Concrete²

3. Terminology

3.1 Definitions of Terms Specific to This Standard:

3.1.1 *datum temperature*—the temperature that is subtracted from the measured concrete temperature for calculating the temperature-time factor according to Eq 1.

3.1.2 *equivalent age*—the number of days or hours at a specified temperature required to produce a maturity equal to the maturity achieved by a curing period at temperatures different from the specified temperature.

3.1.3 *maturity*—the extent of the development of a property of a cementitious mixture.

3.1.3.1 *Discussion*—While the term is used usually to describe the extent of relative strength development, it can also be applied to the evolution of other properties that are dependent on the chemical reactions that occur in a cementitious mixture. At any age, maturity is dependent on the curing history.

3.1.4 *maturity function*—a mathematical expression that uses the measured temperature history of a cementitious mixture during the curing period to calculate an index that is indicative of the maturity at the end of that period. Refer to Appendix X1 for additional discussion of this term.

3.1.5 *maturity index*—an indicator of maturity that is calculated from the temperature history of the cementitious mixture by using a maturity function.

3.1.5.1 *Discussion*—The computed index is indicative of maturity provided there has been a sufficient supply of water for hydration or pozzolanic reaction of the cementitious

¹ This practice is under the jurisdiction of ASTM Committee C-9 on Concrete and Concrete Aggregates and is the direct responsibility of Subcommittee C09.64 on Nondestructive and In-Place Testing.

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² *Annual Book of ASTM Standards*, Vol 04.02.

³ *Annual Book of ASTM Standards*, Vol 04.01.