
Standard Method of Test for Estimating the Strength of Concrete in Transportation Construction by Maturity Tests

AASHTO Designation: T 325-22¹

Technically Revised: 2022

Technical Subcommittee: 3b, Fresh Concrete



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1. SCOPE

- 1.1. This standard provides procedures for estimating concrete strength in roads, bridges, and other transportation structures through the use of a maturity index.
- 1.2. This standard requires determination of the strength–maturity relationship of the approved concrete job mix in the laboratory and determination of the temperature history subsequent to placement in the field.
- 1.3. *This standard may involve hazardous materials, operations, and equipment. It does not purport to address all of the safety concerns associated with its use. It is the responsibility of the user of this standard to consult and establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use.*
- 1.4. *The quality of the results produced by this standard are dependent on the competence of the personnel performing the procedure and the capability, calibration, and maintenance of the equipment used. Agencies that meet the criteria of R 18 are generally considered capable of competent and objective testing/sampling/inspection/etc. Users of this standard are cautioned that compliance with R 18 alone does not completely assure reliable results. Reliable results depend on many factors; following the suggestions of R 18 or some similar acceptable guideline provides a means of evaluating and controlling some of those factors.*
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2. REFERENCED DOCUMENTS

- 2.1. *AASHTO Standards:*
- M 339M/M 339, Thermometers Used in the Testing of Construction Materials
 - R 9, Acceptance Sampling Plans for Highway Construction
 - R 18, Establishing and Implementing a Quality Management System for Construction Materials Testing Laboratories
 - T 276, Measuring Early-Age Compression Strength and Projecting Later-Age Strength
- 2.2. *ASTM Standards:*
- C1074, Standard Practice for Estimating Concrete Strength by the Maturity Method
 - D3665, Standard Practice for Random Sampling of Construction Materials
 - E105, Standard Practice for Probability Sampling of Materials
 - E122, Standard Practice for Calculating Sample Size to Estimate, with Specified Precision, the Average for a Characteristic of a Lot or Process

- < E141, Standard Practice for Acceptance of Evidence Based on the Results of Probability Sampling
- < E230/E230M, Standard Specification for Temperature-Electromotive Force (emf) Tables for Standardized Thermocouples
- n E879, Standard Specification for Thermistor Sensors for General Purpose and Laboratory Temperature Measurements

2.3. *International Electrotechnical Commission Standard:*

- n IEC 60584-1: 2013 Thermocouples - Part 1: EMF Specifications and Tolerances

3. TERMINOLOGY

3.1. *Definitions:*

- 3.1.1. *equivalent age*—the number of days or hours at a specified temperature that would equal the maturity of a concrete at the actual age and temperature history that has been measured.
- 3.1.2. *maturity*—the extent of development of concrete properties that are dependent on cement hydration and pozzolanic reactions.
- 3.1.3. *maturity function*—a mathematical expression that converts the temperature history of concrete to an index, which indicates its maturity.
- 3.1.4. *maturity index*—an index, calculated by using a maturity function, which can be used as an indicator of strength development in concrete.
- 3.1.5. *strength–maturity relationship*—an empirical relationship between concrete strength and its maturity index, usually determined by comparing the strength of concrete cylinders, made from a specific concrete mix, to their maturity index at time of strength testing.

4. SIGNIFICANCE AND USE

- 4.1. This standard can be used to estimate the strength of concrete placed in pavements and structures. These estimates provide guidance useful in making decisions concerning opening to traffic, form removal, post tensioning, termination of curing procedures, and initiation of strength tests on the in-place concrete, such as coring and pullout tests.
- 4.2. The most critical limitations of the procedures presented are (1) batching or placement errors that are not detected, (2) curing errors other than those that affect temperature that are not detected, and (3) the actual strength of the concrete that is not measured.
Note 1—Concrete must be cured in a condition that supports cement hydration/pozzolanic reactions.
- 4.3. This standard provides technical personnel with a coordinated procedure for (1) developing a strength–maturity relationship for the approved concrete job mix in the laboratory, (2) determining the temperature history of the in-place concrete, (3) determining the maturity index of the in-place concrete, and (4) using the strength–maturity relationship and the maturity index to estimate the strength of the in-place concrete.