## Standard Method of Test for

# Measuring Early-Age Compression Strength and Projecting Later-Age Strength

**AASHTO Designation: T 276-17 (2021)**

**Technically Revised: 2017** **Reviewed but Not Updated: 2021** **Editorially Revised: 2021**

**Technical Subcommittee: 3c, Hardened Concrete**

**ASTM Designation: C918-13**

AASHTO

**American Association of State Highway and Transportation Officials**
**555 12th Street NW, Suite 1000**
**Washington, DC 20004**

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## 1. SCOPE

1.1. This test method covers a procedure for making and curing concrete specimens and for testing them at an early age. The specimens are stored under standard curing conditions and the measured temperature history is used to compute a maturity index that is related to strength gain.

1.2. This test method also covers a procedure for using the results of early-age compressive-strength tests to project the potential strength of concrete at later ages.

1.3. The values stated in SI units or inch-pound units are to be regarded separately as standard. The values stated in each system may not be exact equivalents; therefore; each system shall be used independently of the other. Combining values from the two systems may result in nonconformance with the standard.

1.4. The text of this standard references notes and footnotes that provide explanatory material. These notes and footnotes (excluding those in tables and figures) shall not be considered as requirements of the standard.

1.5. *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.*

1.6. *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.*

## 2. REFERENCED DOCUMENTS

2.1. *AASHTO Standards*:

- M 205M/M 205, Molds for Forming Concrete Test Cylinders Vertically
- R 18, Establishing and Implementing a Quality Management System for Construction Materials Testing Laboratories

- R 39, Making and Curing Concrete Test Specimens in the Laboratory
- R 60, Sampling Freshly Mixed Concrete
- R 100, Making and Curing Concrete Test Specimens in the Field
- T 22M/T 22, Compressive Strength of Cylindrical Concrete Specimens
- T 231, Capping Cylindrical Concrete Specimens

2.2. *ASTM Standards*:

- C1074, Standard Practice for Estimating Concrete Strength by the Maturity Method
- C1231/C1231M, Standard Practice for Use of Unbonded Caps in Determination of Compressive Strength of Hardened Cylindrical Concrete Specimens
- C1768/C1768M, Standard Practice for Accelerated Curing of Concrete Cylinders

## 3. TERMINOLOGY

3.1. *Definitions*:

3.1.1. Refer to ASTM C1074 for the definition of the following terms: datum temperature, equivalent age, maturity, maturity function, maturity index, and temperature–time factor.

3.2. *Definition of Terms Specific to This Standard*:

3.2.1. *potential strength*—the strength of a test specimen that would be obtained at a specified age under standard curing conditions.

3.2.2. *prediction equation*—the equation representing the straight-line relationship between compressive strength and the logarithm of the maturity index.

3.2.2.1. *Discussion*—The prediction equation is used to project the strength of a test specimen based upon its measured early-age strength. The general form of the prediction equation used in this test method is:

$$S_M = S_m + b\left(\log M - \log m\right) \qquad (1)$$

where:

$S_M$ = predicted strength at maturity index, $M$;
$S_m$ = measured compressive strength at maturity index, $m$;
$b$ = slope of the line;
$M$ = maturity index under standard curing conditions; and
$m$ = maturity index of the specimen tested at early age.

The prediction equation is developed by performing compressive strength tests at various ages, computing the corresponding maturity indices at the test ages, and plotting the compressive strength as a function of the logarithm of the maturity index. A best-fit line is drawn through the data and the slope of this line is used in the prediction equation.

3.2.3. *projected strength, n*—the potential strength estimated by using the measured early-age strength and the previously established prediction equation.