
Standard Method of Test for

Compressive Strength of Cylindrical Concrete Specimens

AASHTO Designation: T 22M/T 22-20¹

Technical Subcommittee: 3c, Hardened Concrete

Release: Group 1 (April)

ASTM Designation: [C39/C39M-18](#)



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1. SCOPE

- 1.1. This test method covers determination of compressive strength of cylindrical concrete specimens such as molded cylinders and drilled cores. It is limited to concrete having a unit weight in excess of 800 kg/m³ (50 lb/ft³).
- 1.2. The values stated in either SI units or inch-pound units are to be regarded separately as standard. The inch-pound units are shown in parentheses. 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.
- 1.3. *This standard may involve hazardous materials, operations, or equipment. 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.*
Warning—Means should be provided to contain concrete fragments during sudden rupture of specimens. Tendency for sudden rupture increases with increasing concrete strength (Note 1).
Note 1—The safety precautions given in the *Manual of Aggregate and Concrete Testing*, located in the Related Materials section of Vol. 04.02 of the *Annual Book of ASTM Standards*, are recommended.
- 1.4. The text of this standard references notes that provide explanatory material. These notes shall not be considered as requirements of the standard.

2. REFERENCED DOCUMENTS

- 2.1. *AASHTO Standards:*
- [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
 - [T 23](#), Making and Curing Concrete Test Specimens in the Field
 - [T 24M/T 24](#), Obtaining and Testing Drilled Cores and Sawed Beams of Concrete
 - [T 231](#), Capping Cylindrical Concrete Specimens

2.2.

ASTM Standards:

- [C670](#), Standard Practice for Preparing Precision and Bias Statements for Test Methods for Construction Materials
- [C873/C873M](#), Standard Test Method for Compressive Strength of Concrete Cylinders Cast in Place in Cylindrical Molds
- [C1231/C1231M](#), Standard Practice for Use of Unbonded Caps in Determination of Compressive Strength of Hardened Cylindrical Concrete Specimens
- [E4](#), Standard Practices for Force Verification of Testing Machines
- [E74](#), Standard Practices for Calibration and Verification for Force-Measuring Instruments
- R0030, *Manual of Aggregate and Concrete Testing* (not an ASTM standard; available as PDF only)

3.

SUMMARY OF TEST METHOD

3.1.

This test method consists of applying a compressive axial load to molded cylinders or cores at a rate that is within a prescribed range until failure occurs. The compressive strength of the specimen is calculated by dividing the maximum load attained during the test by the cross-sectional area of the specimen.

4.

SIGNIFICANCE AND USE

4.1.

Care must be exercised in the interpretation of the significance of compressive strength determinations by this test method because strength is not a fundamental or intrinsic property of concrete made from given materials. Values obtained will depend on the size and shape of the specimen, batching, mixing procedures, the methods of sampling, molding, and fabrication, and the age, temperature, and moisture conditions during curing.

4.2.

This test method may be used to determine compressive strength of cylindrical specimens prepared and cured in accordance with [R 39](#), [T 23](#), [T 24M/T 24](#), [T 231](#), and [ASTM C873/C873M](#).

4.3.

The results of this test method may be used as a basis for quality control of concrete proportioning, mixing, and placing operations; determination of compliance with specification; and control for evaluating effectiveness of admixtures and similar uses ([R 18](#)).

5.

APPARATUS

5.1.

Testing Machine—The testing machine shall be of a type having sufficient capacity and capable of providing the rates of loading prescribed in Section 7.5.

5.1.1.

Verify calibration of the testing machines in accordance with [ASTM E4](#), except that the verified loading range shall be as required in Section 5.3. Verification is required under the following conditions:

5.1.1.1.

At least annually, but not to exceed 13 months;

5.1.1.2.

On original installation or immediately after relocation;

5.1.1.3.

Immediately after making repairs or adjustments that affect the operation of the force applying system or the values displayed on the load indicating system, except for zero adjustments that compensate for the mass (weight) of tooling or specimen, or both; or