Standard Method of Test for

Obtaining and Testing Drilled Cores and Sawed Beams of Concrete

AASHTO Designation: T 24M/T 24-15 (2019)

Technical Subcommittee: 3c, Hardened Concrete

Release: Group 1 (April)

ASTM Designation: C42/C42M-13

AASHTO

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1. SCOPE

1.1. This test method covers obtaining, preparing, and testing cores drilled from concrete for length or compressive or splitting tensile strength determinations. This test method is not applicable to cores from shotcrete.

Note 1—ASTM Test Method C1604/C1604M is applicable for obtaining, preparing, and testing cores from shotcrete.

Note 2—Appendix X1 provides recommendations for obtaining and testing sawed beams for flexural performance.

1.2. The values stated in either SI units or inch-pound units are to be regarded separately as standard. Within the text, the inch-pound units are shown in brackets. 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. 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.

1.4. *This standard does not purport to address safety concerns 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. *AASHTO Standards*:

- R 39, Making and Curing Concrete Test Specimens in the Laboratory
- T 22, Compressive Strength of Cylindrical Concrete Specimens
- T 97, Flexural Strength of Concrete (Using Simple Beam with Third-Point Loading)
- T 140, Compressive Strength of Concrete Using Portions of Beams Broken in Flexure
- T 148, Measuring Length of Drilled Concrete Cores
- T 198, Splitting Tensile Strength of Cylindrical Concrete Specimens
- T 231, Capping Cylindrical Concrete Specimens

2.2. *ASTM Standards*:

- C642, Standard Test Method for Density, Absorption, and Voids in Hardened Concrete
- C670, Standard Practice for Preparing Precision and Bias Statements for Test Methods for Construction Materials
- C823/C823M, Standard Practice for Examination and Sampling of Hardened Concrete in Constructions
- C1231/C1231M, Standard Practice for Use of Unbonded Caps in Determination of Compressive Strength of Hardened Concrete Specimens
- C1542/C1542M, Standard Test Method for Measuring Length of Concrete Cores
- C1604/C1604M, Standard Test Method for Obtaining and Testing Drilled Cores of Shotcrete

2.3. *ACI Standard*:

- ACI 318, Building Code Requirements for Structural Concrete

3. SIGNIFICANCE AND USE

3.1. This test method provides standardized procedures for obtaining and testing specimens to determine the compressive, splitting tensile, and flexural strength of in-place concrete. Sampling and sample preparation requirements are given to ensure that dimensional requirements are met and that the specimens are made of intact, sound concrete, and are as free of flaws as the particular structure will allow.

3.2. Generally, test specimens are obtained when doubt exists about the in-place concrete quality due either to too-low strength test results during construction or to signs of distress in the structure. Additionally, this method is used to provide strength information on older structures.

3.3. Concrete strength is affected by the location of the concrete in a structural element, with the concrete at the bottom tending to be stronger than the concrete at the top. Core strength is also affected by core orientation relative to the horizontal plane of the concrete as placed, with strength tending to be lower when measured parallel to the horizontal plane.[1] These factors shall be considered in planning the locations for obtaining concrete samples and in comparing strength test results.

3.4. The strength of concrete measured by tests of cores is affected by the amount and distribution of moisture in the specimen at the time of test. There is no standard procedure to condition a specimen that will ensure that, at the time of test, it will be in the identical moisture condition as concrete in the structure. The moisture conditioning procedures in this test method are intended to provide reproducible moisture conditions that minimize within-laboratory and between-laboratory variations and to reduce the effects of moisture introduced during specimen preparation.

3.5. The measured compressive strength of a core will generally be less than that of a corresponding properly molded and cured standard cylinder tested at the same age. For a given concrete, however, there is no unique relationship between the strength of these two types of specimens (see Note 3). The relationship is affected by many factors such as the strength level of the concrete, the in-place temperature and moisture histories, the degree of consolidation, batch-to-batch variability, the strength-gain characteristics of the concrete, the condition of the coring apparatus, and the care used in removing cores.

Note 3—A procedure is available for estimating the equivalent cylinder strength from a measured core strength.

Note 4—In the absence of core strength requirements of an applicable building code or of the other contractual or legal documents that may govern the project, the specifier of the test should establish in the project specifications the acceptance criteria for core strength. An example of