



Designation: C140/C140M – 23a

Standard Test Methods for Sampling and Testing Concrete Masonry Units and Related Units¹

This standard is issued under the fixed designation C140/C140M; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reapproval. A superscript epsilon (ε) indicates an editorial change since the last revision or reapproval.

This standard has been approved for use by agencies of the U.S. Department of Defense.

1. Scope*

1.1 These test methods provide various testing procedures commonly used for evaluating characteristics of concrete masonry units and related concrete units. Methods are provided for sampling, measurement of dimensions, compressive strength, absorption, unit weight (density), moisture content, flexural load, and ballast weight. Not all methods are applicable to all unit types, however.

1.2 Specific testing and reporting procedures are included in annexes to these test methods for the following specific unit types:

- Annex A1**—Concrete masonry units
(Specifications **C90**, **C129**)
- Annex A2**—Concrete and calcium silicate brick
(Specifications **C55**, **C73**, **C1634**)
- Annex A3**—Segmental retaining wall units (Specification **C1372**)
- Annex A4**—Concrete interlocking paving units
(Specification **C936/C936M**)
- Annex A5**—Concrete grid paving units (Specification **C1319**)
- Annex A6**—Concrete roof pavers
(Specification **C1491**)
- Annex A7**—Dry-cast articulating concrete block
(Specification **D6684**)
- Annex A8**—Segmental concrete paving slabs
(Specification **C1782/C1782M**)
- Annex A9**—Concrete ballast block
(Specification **C1884**)

1.3 The test procedures included in these test methods are also applicable to other types of units not referenced in these test methods, but specific testing and reporting requirements for those units are not included.

1.4 These test methods include the following sections:

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NOTE 1—The testing laboratory performing these test methods should be evaluated in accordance with Practice **C1093**.

1.5 The text of this test method 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.

1.6 The values stated in either 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 non-conformance with the standard.

1.7 *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, health, and environmental practices and determine the applicability of regulatory limitations prior to use.*

1.8 *This international standard was developed in accordance with internationally recognized principles on standardization established in the Decision on Principles for the*

¹ These test methods are under the jurisdiction of ASTM Committee **C15** on Manufactured Masonry Units and are the direct responsibility of Subcommittee **C15.03** on Concrete Masonry Units and Related Units.

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*A Summary of Changes section appears at the end of this standard

Development of International Standards, Guides and Recommendations issued by the World Trade Organization Technical Barriers to Trade (TBT) Committee.

2. Referenced Documents

2.1 ASTM Standards:²

- C55 Specification for Concrete Building Brick
 - C73 Specification for Calcium Silicate Brick (Sand-Lime Brick)
 - C90 Specification for Loadbearing Concrete Masonry Units
 - C129 Specification for Nonloadbearing Concrete Masonry Units
 - C143/C143M Test Method for Slump of Hydraulic-Cement Concrete
 - C936/C936M Specification for Solid Concrete Interlocking Paving Units
 - C1093 Practice for Accreditation of Testing Agencies for Masonry
 - C1232 Terminology for Masonry
 - C1319 Specification for Concrete Grid Paving Units
 - C1372 Specification for Dry-Cast Segmental Retaining Wall Units
 - C1491 Specification for Concrete Roof Pavers (Withdrawn 2023)³
 - C1552 Practice for Capping Concrete Masonry Units, Related Units and Masonry Prisms for Compression Testing
 - C1634 Specification for Concrete Facing Brick and Other Concrete Masonry Facing Units
 - C1716/C1716M Specification for Compression Testing Machine Requirements for Concrete Masonry Units, Related Units, and Prisms
 - C1782/C1782M Specification for Segmental Concrete Paving Slabs
 - C1884 Specification for Manufactured Concrete Ballast Units
 - D1056 Specification for Flexible Cellular Materials—Sponge or Expanded Rubber
 - D6684 Specification for Materials and Manufacture of Articulating Concrete Block (ACB) Systems
 - E4 Practices for Force Calibration and Verification of Testing Machines
 - E6 Terminology Relating to Methods of Mechanical Testing
- ### 2.2 Other Documents:
- SP 960-12 NIST Recommended Practice Guide – Stopwatch and Timer Calibration⁴

3. Terminology

3.1 Terminology defined in Terminologies C1232 and E6 shall apply for these test methods.

3.2 Definitions of Terms Specific to This Standard:

3.2.1 *lot, n*—any number of concrete masonry units or related units, designated by the producer, of any configuration or dimension manufactured by the producer using the same materials, concrete mix design, manufacturing process, and curing method.

3.2.2 *web, n*—any portion of a hollow concrete masonry unit connecting the face shells.

3.2.2.1 *Discussion*—A web can be either an end web or interior web connecting face shells. All portions of a unit connecting face shells are considered webs.

4. Significance and Use

4.1 These test methods provide general testing requirements for application to a broad range of concrete products. Those general testing requirements are included in the body of this standard.

NOTE 2—Consult manufacturer, supplier, product specifications, or other resources for more specific measurement or testing guidelines for those products not addressed with the annex of this standard.

4.2 These test methods provide specific testing requirements in two distinct sections, the requirements applicable to all units covered by these test methods and those applicable to the specific unit types. The requirements applicable to all units are included in the body of these test methods and those applicable to the specific unit types are included within the annexes.

5. Sampling

5.1 Selection of Test Specimens:

5.1.1 For purposes of testing, full-sized units shall be selected by the purchaser or authorized representative. The selected specimens shall be of similar configuration and dimensions. Specimens shall be representative of the whole lot of units from which they are selected.

5.2 Number of Specimens:

5.2.1 Unless specified otherwise in the applicable annex, a set of units shall consist of six full-size units.

5.3 Remove loose material from the specimens (including the cores) prior to determining the received weight.

NOTE 3—An abrasive stone or wire brush is typically used to remove loose material.

5.4 *Identification*—Mark each specimen so that it may be identified at any time. Markings shall cover not more than 5 % of the surface area of the specimen.

5.5 *Received Weight*—Prior to performing tests, weigh each full-size specimen after sampling and marking, and record as w_r (received weight) to the accuracy required in Table 1. Record time and place w_r was measured.

NOTE 4—Received weights often have direct relationships with other unit properties and are therefore a useful method of evaluating results or for sorting purposes. It is good laboratory practice to separate sampled units for strength and absorption testing by received weight, such that the averages of the subsets of specimens are similar and representative of the

² For referenced ASTM standards, visit the ASTM website, www.astm.org, or contact ASTM Customer Service at service@astm.org. For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.

³ The last approved version of this historical standard is referenced on www.astm.org.

⁴ Available at <http://tf.nist.gov/general/pdf/2281.pdf>