



Designation: C55 – 17

Standard Specification for Concrete Building Brick¹

This standard is issued under the fixed designation C55; 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 This specification covers solid, dry-cast, concrete building brick intended for interior and exterior use in constructing structural masonry, and are made from portland cement, water, and suitable mineral aggregates with or without the inclusion of other materials.

NOTE 1—Specification C1634 addresses concrete facing brick used in facing applications and other exposures (previously referred to in earlier editions of this standard as Grade N—for use as architectural veneer and facing units in exterior walls and for use where high-strength and resistance to moisture penetration and severe frost action are desired). This specification differs from C1634 in that it addresses properties for concrete building brick used in non-facing, utilitarian applications (previously referred to in earlier editions of this specification as Grade S—for general use where moderate strength and resistance to frost action and moisture penetration are required).

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

1.3 The values stated in inch-pound units are to be regarded as the standard. The values given in parentheses are for information only.

NOTE 2—Concrete building brick covered by this specification are made from lightweight or normal weight aggregates, or both.

NOTE 3—When particular features are desired, such as density classification, high compressive strength, surface textures for appearance or bond, finish, color, fire resistance, insulation, acoustical properties, or other special features, such properties should be specified separately by the purchaser. Suppliers should be consulted as to the availability of concrete building brick having the desired features.

1.4 The values stated in inch-pound units are to be regarded as standard. The values given in parentheses are mathematical conversions to SI units that are provided for information only and are not considered standard.

1.5 *This international standard was developed in accordance with internationally recognized principles on standard-*

ization established in the Decision on Principles for the 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

C33 Specification for Concrete Aggregates
C140 Test Methods for Sampling and Testing Concrete Masonry Units and Related Units
C150 Specification for Portland Cement
C331 Specification for Lightweight Aggregates for Concrete Masonry Units
C426 Test Method for Linear Drying Shrinkage of Concrete Masonry Units
C595 Specification for Blended Hydraulic Cements
C618 Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use in Concrete
C989 Specification for Slag Cement for Use in Concrete and Mortars
C1157 Performance Specification for Hydraulic Cement
C1232 Terminology of Masonry
C1634 Specification for Concrete Facing Brick

3. Terminology

3.1 Terminology defined in Terminology C1232 shall apply for this specification.

3.2 Definitions of Terms Specific to This Standard:

3.2.1 *concrete building brick, n*—a concrete masonry unit, with a maximum width of four (4) inches and of a weight that will typically permit it to be lifted and placed with one hand, that is manufactured for general use in non-facing, utilitarian applications.

3.2.2 *concrete facing brick, n*—a concrete masonry unit, with a maximum width of four (4) inches and of a weight that will typically permit it to be lifted and placed with one hand,

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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.

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

that is manufactured to be typically used in an application where one or more faces of the unit is intended to be exposed.

4. Materials and Manufacture

4.1 *Cementitious Materials*—Materials shall conform to the following applicable specifications:

4.1.1 *Portland Cement*—Specification **C150**.

4.1.2 *Modified Portland Cement*—Portland cement conforming to Specification **C150**, modified as follows:

4.1.2.1 *Limestone*—Calcium carbonate, with a minimum 85 % CaCO₃ content, is permitted to be added to the cement, provided these requirements of Specification **C150** as modified are met:

(1) *Limitation on Insoluble Residue*—1.5 %.

(2) *Limitation on Air Content of Mortar*—Volume percent, 22 % max.

(3) *Limitation on Loss on Ignition*—7 %.

4.1.3 *Blended Hydraulic Cements*—Specification **C595**.

4.1.4 *Hydraulic Cement*—Specification **C1157**.

4.1.5 *Pozzolans*—Specification **C618**.

4.1.6 *Blast Furnace Slag Cement*—Specification **C989**.

4.2 *Aggregates*—Aggregates shall conform to the following specifications, except that grading requirements shall not necessarily apply:

4.2.1 *Normal Weight Aggregates*—Specification **C33**.

4.2.2 *Lightweight Aggregates*—Specification **C331**.

4.3 *Other Constituents*—Air-entraining agents, coloring pigments, integral water repellents, finely ground silica, and other constituents shall be previously established as suitable for use in concrete masonry units and shall conform to applicable ASTM standards or shall be shown by test or experience not to be detrimental to the durability of the concrete masonry units or any material customarily used in masonry construction.

5. Physical Requirements

5.1 At the time of delivery to the purchaser, units shall conform to the physical requirements prescribed in **Table 1**. All units shall be sound and free of cracks or other defects that interfere with the proper placement of the units or significantly impair the strength or permanence of the construction. Minor cracks incidental to the usual method of manufacture or minor chipping resulting from customary methods of handling in shipment and delivery are not grounds for rejection.

5.1.1 When higher compressive strengths than those listed in **Table 1** are specified, the tested average net area compressive strength of three units shall equal or exceed the specified compressive strength, and the following single unit strength requirements shall apply.

5.1.1.1 When the specified compressive strength is less than 5000 psi, no single unit net area compressive strength test result shall be less than the specified compressive strength minus 500 psi. Compressive strength shall be tested in accordance with **8.2**.

5.1.1.2 When the specified compressive strength is 5000 psi or greater, no single unit net area compressive strength test result shall be less than 90 % of the specified compressive strength. Compressive strength shall be tested in accordance with **8.2**.

5.2 At the time of delivery to the purchaser, the average total linear drying shrinkage of the three units tested shall not exceed 0.065 % when tested in accordance with **8.3**.

NOTE 4—The purchaser is the public body or authority, association, corporation, partnership, or individual entering into a contract or agreement to purchase or install, or both, concrete building brick. The time of delivery to the purchaser is FOB plant when the purchaser or the purchaser's agent transports the concrete building brick, or at the time unloaded at the worksite if the manufacturer or the manufacturer's agent transports the concrete building brick.

6. Dimensions and Permissible Variations

6.1 No overall dimension (width, height, and length) shall differ by more than $\pm \frac{1}{8}$ in. (3.2 mm) from the specified standard dimensions.

NOTE 5—Standard dimensions of concrete building brick are the manufacturer's designated dimensions. Nominal dimensions of modular size concrete building brick are equal to the standard dimensions plus the thickness of one mortar joint. Nominal dimensions of nonmodular size concrete building brick usually exceed the standard dimensions by $\frac{1}{8}$ to $\frac{1}{4}$ in. (3.2 to 6.4 mm).

6.2 *Coring*—Unless otherwise specified, brick shall be either solid or cored at the option of the seller. For cored concrete building brick, the net cross-sectional area in any plane parallel to the surface containing the cores shall be at least 75 % of the gross cross-sectional area measure in the same plane. No part of any hole shall be less than $\frac{3}{4}$ in. (19.1 mm) from any edge of the unit.

7. Finish and Appearance

7.1 No more than 5 % of the units in the shipment shall exhibit one or more of the characteristics described in **7.1.1** and **7.1.2**.

7.1.1 Units with dimensions not meeting the requirements of **6.1**.

7.1.2 Units that are broken.

TABLE 1 Strength, Absorption, and Density Classification Requirements^A

Density Classification	Oven-Dry Density of Concrete, lb/ft ³ (kg/m ³)	Maximum Water Absorption, lb/ft ³ (kg/m ³)		Minimum Net Area Compressive Strength, lb/in ² (MPa)	
		Average of 3 Units	Individual Units	Average of 3 Units	Individual Units
Lightweight	Less than 105 (1680)	18 (288)	20 (320)	2500 (17.2)	2000 (13.8)
Medium Weight	105 to less than 125 (1680–2000)	15 (240)	17 (272)	2500 (17.2)	2000 (13.8)
Normal Weight	125 (2000) or more	13 (208)	15 (240)	2500 (17.2)	2000 (13.8)

^ACompressive strength, absorption, and density determined in accordance with **8.2**.

8. Methods of Sampling and Testing

8.1 The purchaser or authorized representative shall be accorded proper facilities to inspect and sample the concrete building brick at the place of manufacture from the lots ready for delivery.

8.2 Compressive strength, absorption, density, and dimensional tolerances shall be based on tests of concrete building brick of any configuration or dimensions made with the same materials, concrete mix design, manufacturing process, and curing method, conducted in accordance with Test Methods C140 and not more than 12 months prior to delivery.

8.3 Total linear drying shrinkage shall be based on tests of concrete building brick of any configuration or dimensions made with the same materials, concrete mix design, manufacturing process, and curing method, conducted in accordance with Test Method C426 and not more than 24 months prior to delivery.

9. Compliance

9.1 If a sample fails to conform to the specified requirements, the manufacturer shall be permitted to remove

units from the shipment. A new sample shall be selected by the purchaser from remaining units from the shipment with a similar configuration and dimension and tested at the expense of the manufacturer. If the second sample meets the specified requirements, the remaining portion of the shipment represented by the sample meets the specified requirements. If the second sample fails to meet the specified requirements, the remaining portion of the shipment represented by the sample fails to meet the specified requirements.

NOTE 6—Unless otherwise specified in the purchase order, the costs of tests is typically borne as follows: (1) if the results of the tests show that the units do not conform to the requirements of this specification, the cost is typically borne by the seller; (2) if the results of the tests show that the units conform to the specification requirements, the cost is typically borne by the purchaser.

10. Keywords

10.1 absorption; compressive strength; concrete brick; concrete building brick; concrete masonry units; linear drying shrinkage; portland cement

SUMMARY OF CHANGES

Committee C15 has identified the location of selected changes to this standard since the last issue (C55 – 16) that may impact the use of this standard. (June 1, 2017)

(1) Modified the testing frequency in Section 8 to be based on time of delivery.

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