



Designation: **C55—11 C55 – 14**

## Standard Specification for Concrete Building Brick<sup>1</sup>

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 ( $\epsilon$ ) 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.

### 2. Referenced Documents

2.1 *ASTM Standards*:<sup>2</sup>

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:*

<sup>1</sup> This specification is under the jurisdiction of ASTM Committee C15 on Manufactured Masonry Units and is the direct responsibility of Subcommittee C15.03 on Concrete Masonry Units and Related Units.

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<sup>2</sup> 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

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, 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 % CaCO<sub>3</sub> 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.

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.

5.2 At the time of delivery to the purchaser, the total linear drying shrinkage of units shall not exceed 0.065 % when tested in accordance with Test Method C426.

**TABLE 1 Strength, Absorption, and Density Classification Requirements<sup>A</sup>**

Density Classification	Oven-Dry Density of Concrete, lb/ft <sup>3</sup> (kg/m <sup>3</sup> )	Maximum Water Absorption, lb/ft <sup>3</sup> (kg/m <sup>3</sup> )		Minimum Net Area Compressive Strength, lb/in <sup>2</sup> (MPa)	
	Average of 3 Units	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)

**TABLE 1 Strength, Absorption, and Density Classification Requirements<sup>A</sup>**

Density Classification	Oven-Dry Density of Concrete, lb/ft <sup>3</sup> (kg/m <sup>3</sup> )	Maximum Water Absorption, lb/ft <sup>3</sup> (kg/m <sup>3</sup> )		Minimum Net Area Compressive Strength, lb/in <sup>2</sup> (MPa)	
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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)

<sup>A</sup>Average oven-dry density, based on a set of three units, shall fall within ranges defined in the table to be classified as lightweight, medium weight, or normal weight.