



Designation: **C55–17** C55 – 22

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 reappraisal. A superscript epsilon (ϵ) indicates an editorial change since the last revision or reappraisal.

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.~~

~~1.2 The values stated in inch-pound units are to be regarded as the standard. The values given in parentheses are for information only. 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.~~

~~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.~~

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

1.4 This international standard was developed in accordance with internationally recognized principles on standardization 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

- ~~E33~~C33/C33M Specification for Concrete Aggregates
- ~~E140~~C140/C140M Test Methods for Sampling and Testing Concrete Masonry Units and Related Units
- ~~E150~~C150/C150M Specification for Portland Cement
- ~~E331~~C331/C331M Specification for Lightweight Aggregates for Concrete Masonry Units
- C426 Test Method for Linear Drying Shrinkage of Concrete Masonry Units
- ~~E595~~C595/C595M Specification for Blended Hydraulic Cements
- C618 Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use in Concrete
- C979/C979M Specification for Pigments for Integrally Colored Concrete
- ~~E989~~C989/C989M Specification for Slag Cement for Use in Concrete and Mortars
- ~~E1157~~C1157/C1157M Performance Specification for Hydraulic Cement
- C1232 Terminology for Masonry
- C1240 Specification for Silica Fume Used in Cementitious Mixtures
- C1634 Specification for Concrete Facing Brick and Other Concrete Masonry Facing Units

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, 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 E150C150/C150M.

4.1.2 *Modified Portland Cement*—Portland cement conforming to Specification E150C150/C150M, 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 %.

(1) *Limestone*—If calcium carbonate is added to the cement, the CaCO₃ content shall not be less than 85 %.

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

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

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

4.1.3 *Blended Hydraulic Cements*—Specification E595C595/C595M.

4.1.4 *Hydraulic Cement*—Specification E1157C1157/C1157M.

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.

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

4.1.6 *Blast Furnace Slag Cement*—Specification **E989C989/C989M**.

4.1.7 *Silica Fume*—Specification **C1240**.

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

4.2.1 *Normal Weight Aggregates*—Specification **E33C33/C33M**.

4.2.2 *Lightweight Aggregates*—Specification **E33C331/C331M**.

NOTE 4—The grading requirements of Specifications C33/C33M and C331/C331M may not be suitable for concrete masonry production. Because of this, producers are allowed to modify grading to meet their needs and the requirements of this specification.

4.3 *Pigments for Integrally Colored Concrete*—Specification **C979/C979M**.

4.4 *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~~building brick 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~~building brick 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~~Units shall be sound and free of cracks or other defects that interfere with the proper placement of the units or ~~defects that 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 **8-27.2**.

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 **8-27.2**.

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 **8-37.3**.

NOTE 5—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.

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	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 **8-27.2**.