



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

This standard is issued under the fixed designation C 55; 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 Department of Defense.*

<sup>e1</sup> NOTE—Metric conversions in Table 1 were editorially corrected in June 2007.

## 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 C 1634 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 C 1634 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.

<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.

Current edition approved Dec. 15, 2006. Published January 2007. Originally approved in 1924. Last previous edition approved in 2003 as C 55 – 03.

## 2. Referenced Documents

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

- C 33 Specification for Concrete Aggregates
- C 140 Test Methods for Sampling and Testing Concrete Masonry Units and Related Units
- C 150 Specification for Portland Cement
- C 331 Specification for Lightweight Aggregates for Concrete Masonry Units
- C 426 Test Method for Linear Drying Shrinkage of Concrete Masonry Units
- C 595 Specification for Blended Hydraulic Cements
- C 618 Specification for Coal Fly Ash and Raw or Calcined Natural Pozzolan for Use in Concrete
- C 989 Specification for Ground Granulated Blast-Furnace Slag for Use in Concrete and Mortars
- C 1157 Performance Specification for Hydraulic Cement
- C 1209 Terminology of Concrete Masonry Units and Related Units
- C 1232 Terminology of Masonry
- C 1634 Specification for Concrete Facing Brick

## 3. Terminology

3.1 Terminology defined in Terminology C 1209 and Terminology C 1232 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.

<sup>2</sup> For referenced ASTM standards, visit the ASTM website, [www.astm.org](http://www.astm.org), or contact ASTM Customer Service at [service@astm.org](mailto: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.

#### 4. Materials and Manufacture

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

4.1.1 *Portland Cement*—Specification **C 150**.

4.1.2 *Modified Portland Cement*—Portland cement conforming to Specification **C 150**, 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 **C 150** 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 **C 595**.

4.1.4 *Hydraulic Cement*—Specification **C 1157**.

4.1.5 *Pozzolans*—Specification **C 618**.

4.1.6 *Blast Furnace Slag Cement*—Specification **C 989**.

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 **C 33**.

4.2.2 *Lightweight Aggregates*—Specification **C 331**.

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**.

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 **C 426**.

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  $\pm 1/8$  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  $1/8$  to  $1/4$  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  $3/4$  in. (19.1 mm) from any edge of the unit.

#### 7. Finish and Appearance

7.1 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.

#### 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 Sample and test concrete building brick in accordance with Test Methods **C 140** and Test Method **C 426**, when applicable.

8.3 Total linear drying shrinkage shall be based on tests of concrete building brick made with the same materials, concrete mix design, manufacturing process, and curing method, conducted in accordance with Test Method **C 426** 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.

**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)

<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.

† Editorially corrected.

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 shrinkage; portland cement

## SUMMARY OF CHANGES

Committee C15 has identified the location of selected changes to this standard since the last issue (C 55 – 03) that may impact the use of this standard. (Approved Dec. 15, 2006.)

- (1) The title of this specification was changed from Concrete Brick to Concrete Building Brick.
- (2) Grade N and Grade S designations were removed. Changes were made throughout to reflect scope change to address only those units used for utilitarian purposes.

- (3) Materials section was replaced to be consistent with other concrete masonry unit specifications.
- (4) New terminology was added for concrete facing brick and concrete building brick.

*ASTM International takes no position respecting the validity of any patent rights asserted in connection with any item mentioned in this standard. Users of this standard are expressly advised that determination of the validity of any such patent rights, and the risk of infringement of such rights, are entirely their own responsibility.*

*This standard is subject to revision at any time by the responsible technical committee and must be reviewed every five years and if not revised, either reapproved or withdrawn. Your comments are invited either for revision of this standard or for additional standards and should be addressed to ASTM International Headquarters. Your comments will receive careful consideration at a meeting of the responsible technical committee, which you may attend. If you feel that your comments have not received a fair hearing you should make your views known to the ASTM Committee on Standards, at the address shown below.*

*This standard is copyrighted by ASTM International, 100 Barr Harbor Drive, PO Box C700, West Conshohocken, PA 19428-2959, United States. Individual reprints (single or multiple copies) of this standard may be obtained by contacting ASTM at the above address or at 610-832-9585 (phone), 610-832-9555 (fax), or service@astm.org (e-mail); or through the ASTM website (www.astm.org).*