



Designation: C126 – 09

# Standard Specification for Ceramic Glazed Structural Clay Facing Tile, Facing Brick, and Solid Masonry Units<sup>1</sup>

This standard is issued under the fixed designation C126; 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.*

## 1. Scope\*

1.1 This specification covers structural clay load-bearing facing tile and facing brick and other “solid masonry units” made from clay, shale, fire-clay, or mixtures thereof, with or without the addition of grog or other mixtures, having a finish consisting of a ceramic glaze fused to the body at above 1500°F (655°C) making them inseparable, excluding natural salt-glazed ware. Two grades, based on permissible variation in face dimensions, and two types are covered, as follows:

1.1.1 *Grade S (select)*, for use with comparatively narrow mortar joints.

1.1.2 *Grade SS (select sized or ground edge)*, for use where variation of face dimension must be very small.

1.1.3 *Type I (single-faced units)*, for general use where only one finished face will be exposed.

1.1.4 *Type II (two-faced units)*, for use where two opposite finished faces will be exposed.

1.2 The property requirements of this specification apply at the time of purchase. The use of results from testing of brick and tile extracted from masonry structures for determining conformance or nonconformance to the property requirements (Section 5) of this standard is beyond the scope of this specification.

1.3 Brick and tile covered by this specification are manufactured from clay, shale, or similar naturally occurring substances and subjected to a heat treatment at elevated temperatures (firing). The heat treatment must develop sufficient fired bond between the particulate constituents to provide the strength requirements of this specification. (See firing and fired bond in Terminology C1232.)

1.4 The text of this standard 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.

<sup>1</sup> This specification is under the jurisdiction of ASTM Committee C15 on Manufactured Masonry Units and is the direct responsibility of Subcommittee C15.02 on Brick and Structural Clay Tile.

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1.5 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.

1.6 The following precautionary caveat pertains only to the test portion (Section 15) of this specification. *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 and health practices and determine the applicability of regulatory limitations prior to use.*

## 2. Referenced Documents

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

C67 Test Methods for Sampling and Testing Brick and Structural Clay Tile

C1232 Terminology of Masonry

E84 Test Method for Surface Burning Characteristics of Building Materials

### 2.2 National Fire Protection Association Standard:<sup>3</sup>

NFPA No. 255 Test for Surface Burning Characteristics of Building Materials

### 2.3 Underwriters Laboratories, Inc. Standard:<sup>4</sup>

UL No. 723 Flammability Studies of Cellular Plastics and other Building Materials used for Interior Finishes

### 2.4 International Conference of Building Officials Standard:<sup>5</sup>

UBC No. 8-1 Test Method for Fire Hazard Classification of Building Material

### 2.5 Government Standard:<sup>6</sup>

<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.

<sup>3</sup> Available from National Fire Protection Association (NFPA), 1 Batterymarch Park, Quincy, MA 02169-7471, <http://www.nfpa.org>.

<sup>4</sup> Available from Underwriters Laboratories (UL), 333 Pfingsten Rd., Northbrook, IL 60062-2096, <http://www.ul.com>.

<sup>5</sup> Available from the International Conference of Building Officials, 5360 S. Workman Mill Rd., Whittier, CA 90601.

<sup>6</sup> Available from Standardization Documents Order Desk, Bldg. 4 Section D, 700 Robbins Ave., Philadelphia, PA 19111-5094, Attn: NPODS.

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

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### 3. Ordering Information

3.1 Orders for material under this specification shall include the following information:

3.1.1 *Grade*—When the grade is not specified, the requirements for Grade S shall govern.

3.1.2 *Type*—When the type is not specified, the requirements for Type I shall govern.

3.1.3 *Sizes and Shapes*—The sizes and shapes shall be specified in accordance with Section 8.

3.1.4 *Color and Texture of Finish*—The color and texture of the finish shall be specified in accordance with Section 7.

3.1.5 *Back Surfaces*—Unless otherwise specified, smooth, scored, combed, or roughened unglazed backs and smooth unselected glazed backs or a mixture thereof, are furnished. When plaster is to be applied, the back surface shall be specified in accordance with Section 12.

3.1.6 *Coring*—Unless otherwise specified, either standard or special duty units as prescribed in Section 12 are furnished.

3.1.7 *Opacity*—Where ceramic glazed units are not specified as opaque, they need not meet the requirements for opacity prescribed in 6.2.

3.1.8 *Exterior Use*—Where ceramic glazed units are required for exterior use, the manufacturers shall be consulted for material suitable for this purpose.

NOTE 1—The requirements included in this specification do not cover minimum criteria for durability of units exposed to exterior environments.

### 4. Compressive Strength

4.1 The compressive strengths (based on gross area) of the units shall be not less than the values prescribed in Table 1.

**TABLE 1 Compressive Strengths of Units**

NOTE—Special duty units are available from various manufacturers where higher compressive strengths are required.

Direction of Coring	Minimum Average of Five Tests, psi (MPa)	Individual Minimum, psi (MPa)
Vertical	3 000 (20.7)	2 500 (17.2)
Horizontal	2 000 (13.8)	1 500 (10.3)

### 5. Workmanship, Finish, and Appearance

5.1 The body of the units shall be free of cracks or other imperfections which would impair the strength or durability of the masonry.

5.2 Unless otherwise agreed upon between the purchaser and the seller, a delivery of brick or tile shall not contain more than 3 % brick or tile that are chipped, cracked or broken.

5.3 The finished face (one face of stretcher units and the finished faces of shapes) that will be exposed when in place shall be covered with a ceramic glaze of uniform quality. The glaze shall be free of chips, crazes, blisters, crawling, or other imperfections detracting from the appearance of the finished wall when viewed from a distance of 5 ft (1.52 m) at right angles from the wall.

NOTE 2—The purchaser or his authorized representative shall be accorded opportunity for sampling and inspecting units at the place of

manufacture, prior to shipment. At least 10 days from the time of sampling should be allowed for completion of the tests. Unless otherwise specified in the purchase order, the cost of tests is typically borne as follows: If the results of the tests show that the brick does not conform to the requirements of this specification, the cost is typically borne by the seller. If the results of the tests show that the brick does conform to the requirements of this specification, the cost is typically borne by the purchaser.

### 6. Properties of Finish

6.1 *Imperviousness*—After the imperviousness test, no stain seen from a distance of 5 ft (1.5 m) shall remain on or beneath the surface, except a slight discoloration in the depressions on matt, stippled, or mottled finishes.

6.2 *Opacity*—Where opacity of finish is desired and so specified, discoloration of the body shall not be visible through the glaze in the opacity test. Clear ceramic glazes and special decorative glazes shall not be required to meet this requirement.

6.2.1 *Resistance to Fading*—The color of the glaze shall not change in the chemical resistance test. Finishes of metallic or special decorative glazes shall not be required to meet this requirement.

6.2.2 *Resistance to Crazing*—The glaze shall not craze, spall, or crack when subjected to one cycle of autoclaving in the crazing test.

6.2.3 *Flame Spread, Fuel Contribution and Smoke Density*—Body and finish must withstand temperatures up to 1900°F (878°C) without distortion or melting and rate “non-combustible.” When tested in accordance with the provisions of Test Method E84, structural facing tile shall measure 0 flame spread, 0 fuel contribution, and 0 smoke density. This test method is similar to that specified in NFPA No. 255, UL No. 723, and UBC No. 8-1.

6.2.4 *Toxic Fumes*—Toxic fumes will not be released from the body or glaze finish at temperatures up to 1900°F, and when tested under Test Method E84.

6.2.5 *Hardness and Abrasion Resistance*—Glaze must resist scratching by ordinary glass or steel and be rated above five on the Mohs Hardness Scale. When tested for abrasion, under wear index method No. 6192 (Federal Standard Test No. 141), using a standard Taber Abraser Model CS-17 calibre wheel and a 1000 g weight for 1000 wear cycles, the glazed face shall have a wear factor not in excess of 15. Finishes of metallic or special decorative glazes shall not be required to meet this requirement.

### 7. Color and Texture

7.1 The textures shall be mottled, stippled, or smooth as specified and the color of the finished surface shall be indicated by a sample consisting of not less than three stretcher units representing the range of shades.

### 8. Sizes and Shapes

8.1 The face sizes of ceramic glazed units and fittings therefore shall be as specified.

NOTE 3—The sizes shown in Table 2 are standard in the industry for single-faced units (Type I). Two-faced units (Type II) are standard in the industry, in 3¾-in. (95.3-mm) and 5¾-in. (146-mm) thickness only.

**TABLE 2 Size of Single-Faced Units**

Series Designation	Specified Face Dimensions		Specified Thickness, in. (mm)
	Height, in. (mm)	Length, in. (mm)	
4S	2 <sup>3</sup> / <sub>8</sub> (60.3)	7 <sup>3</sup> / <sub>4</sub> (196.9)	1 <sup>3</sup> / <sub>4</sub> or 3 <sup>3</sup> / <sub>4</sub> (44.5 or 95.3)
4D	5 <sup>1</sup> / <sub>16</sub> (128.6)	7 <sup>3</sup> / <sub>4</sub> (196.9)	1 <sup>3</sup> / <sub>4</sub> , 3 <sup>3</sup> / <sub>4</sub> , 5 <sup>3</sup> / <sub>4</sub> , or 7 <sup>3</sup> / <sub>4</sub> (44.5, 95.3, 146.1, 196.9)
6P	3 <sup>3</sup> / <sub>4</sub> (95.3)	11 <sup>3</sup> / <sub>4</sub> (298.5)	1 <sup>3</sup> / <sub>4</sub> , 3 <sup>3</sup> / <sub>4</sub> , 5 <sup>3</sup> / <sub>4</sub> , or 7 <sup>3</sup> / <sub>4</sub> (44.5, 95.3, 146.1, 196.9)
6T	5 <sup>1</sup> / <sub>16</sub> (128.6)	11 <sup>3</sup> / <sub>4</sub> (298.5)	1 <sup>3</sup> / <sub>4</sub> , 3 <sup>3</sup> / <sub>4</sub> , 5 <sup>3</sup> / <sub>4</sub> , or 7 <sup>3</sup> / <sub>4</sub> (44.5, 95.3, 146.1, 196.9)
6M	5 <sup>3</sup> / <sub>4</sub> (146.1)	11 <sup>3</sup> / <sub>4</sub> (298.5)	1 <sup>3</sup> / <sub>4</sub> , 3 <sup>3</sup> / <sub>4</sub> , 5 <sup>3</sup> / <sub>4</sub> , or 7 <sup>3</sup> / <sub>4</sub> (44.5, 95.3, 146.1, 196.9)
8W	7 <sup>3</sup> / <sub>4</sub> (196.9)	15 <sup>3</sup> / <sub>4</sub> (400.1)	1 <sup>3</sup> / <sub>4</sub> or 3 <sup>3</sup> / <sub>4</sub> (44.5 or 95.3)

## 9. Number of Cells

9.1 Requirements for number of cells apply to hollow units only. Cells are hollow spaces enclosed within the perimeter of the exterior shells having a minimum dimension of not less than 1/2 in. (12.7 mm) and a cross-sectional area greater than 1 1/2 in.<sup>2</sup> (9.7 cm<sup>2</sup>). Hollow units of 6-in. (152.4 mm) and 8-in. (203.2 mm) thickness shall have not less than 2 cells or rows of cells in the direction of wall thickness.

9.2 Double-shell tile shall be considered as having one additional cell in the direction of wall thickness if either:

9.2.1 The combined width of the voids between exterior and interior shells on both sides of the tile is not less than 1/2 in. (12.7 mm) and the combined thickness of the short webs between inner and outer shells is not greater than that of the long transverse webs holding the inner shells, or

9.2.2 The combined thickness of the inner and outer shells on each side of the tile is not less than 1 in. (25.4 mm).

9.3 The face shells of single-shell tile with multicored or solid-face shells at least 1 1/2 in. (38.1 mm) in thickness on both sides of the tile shall be considered as one additional cell in wall thickness, provided the volume of the cores in multicored shells does not exceed 35 % of the gross volume of the face shell and the minimum distance from perimeter of core to either side of shell is not less than 3/8 in. (9.5 mm).

## 10. Shell and Web Thickness

10.1 *Multicored Units*—The minimum distance from the perimeter of core to the outer surface of the shell of multicored units shall be not less than 3/4 in. (19 mm).

10.2 The thickness of connecting webs between cores of multicored units, multicored shells, or supplementary cores of hollow units, shall be not less than 1/4 in. (6.4 mm).

10.3 *Hollow Units*—The average overall thickness of the shells, measured between the inner and extreme outer surfaces of vertical-cell hollow units, shall be not less than 3/4 in. (19 mm). The thickness of the webs shall be not less than 1/2 in. (12.7 mm).

10.4 The average over-all thickness of the side (face) shells, measured between the inner and extreme outer surfaces of horizontal-cell hollow units, shall be not less than 3/4 in. (19 mm). The net thickness of the top and bottom shells shall be not less than 1/2 in. (12.7 mm); that is, when the top and bottom shells are scored, the over-all thickness of the top and bottom shells shall be not less than 1/2 in. plus the depth of the grooves. The thickness of the webs shall be not less than 1/2 in.

10.5 The horizontal width of any cell in horizontal-cell hollow units shall not exceed 4 1/2 times the average over-all thickness of either the upper or lower bearing shell.

## 11. Tolerances on Dimensions

11.1 *Face Dimension Tolerances*—The total variation in the finished face dimensions of units shall be not more than the amounts shown in Table 3.

11.2 *Bed-Depth Dimension Tolerances*—The total variation in the bed-depth (through the wall) dimension of units shall be not more than the amount shown in Table 4.

11.3 *Distortion Tolerances*—The maximum permissible deviation of the plane and the edges of the face of individual units from a plane surface and from a straight line, respectively, shall not exceed the amount shown in Table 5.

## 12. Plaster Base Finish

12.1 Unless otherwise specified by the purchaser, smooth, scored, combed or roughened-back units or a mixture thereof are furnished.

12.2 When smooth, at least 90 % of the tile area shall be free of glaze and the average absorption shall be not less than 5 %, unless acceptable plaster adhesion bond test data is provided.

12.3 When scored, each groove shall be dovetailed and shall be not less than 1/16 in. (1.6 mm) nor more than 1/4 in. (6.4 mm) in depth, and not more than 1 in. (25.4 mm) in width. The area covered by the grooves shall not exceed 50 % of the area of the scored faces.

**TABLE 3 Permissible Variations in Face Dimensions**

NOTE 1—Permissible variations for units having dimensions more than 1/4 in. (6.4 mm) greater than shown in this table shall be the same as for the next larger dimension.

NOTE 2—Other sizes are available conforming to the provisions of Grade SS units; however, the standard face dimensions are permitted to be 1/16 in. less than the specified face dimensions listed in Table 3 for Grade S (or Grade SS) Units.

Specified Face Dimension, Return or Reveal (Height, Length), in. (mm)	Maximum Difference Between Dimension of Any Unit and the Specified Dimension		Maximum Difference Between Largest and Smallest Unit in One Lot, <sup>A</sup> in. (mm)
	If Larger, in. (mm)	If Smaller, in. (mm)	
<b>Grade S Units</b>			
2 <sup>3</sup> / <sub>8</sub> (60.3)	1/16 (1.6)	3/32 (2.4)	3/32 (2.4)
3 <sup>3</sup> / <sub>4</sub> (95.3)	1/16 (1.6)	3/32 (2.4)	3/32 (2.4)
5 <sup>1</sup> / <sub>16</sub> (128.6)	1/16 (1.6)	3/32 (2.4)	3/32 (2.4)
5 <sup>3</sup> / <sub>4</sub> (146.1)	1/16 (1.6)	3/32 (2.4)	3/32 (2.4)
7 <sup>3</sup> / <sub>4</sub> (196.9)	1/16 (1.6)	1/8 (3.2)	5/32 (4.0)
11 <sup>3</sup> / <sub>4</sub> (198.5)	1/16 (1.6)	3/32 (4.0)	3/16 (4.8)
<b>Grade SS—Select Sized or Ground-Edge Units Only</b>			
7 <sup>3</sup> / <sub>4</sub> (196.9)	1/16 (1.6)	1/16 (1.6)	3/32 (2.4)
15 <sup>3</sup> / <sub>4</sub> (400.1)	1/16 (1.6)	1/16 (1.6)	3/32 (2.4)

<sup>A</sup> Size of lot shall be determined by agreement between the purchaser and the seller.